United States
Department
of Agriculture

Forest Service

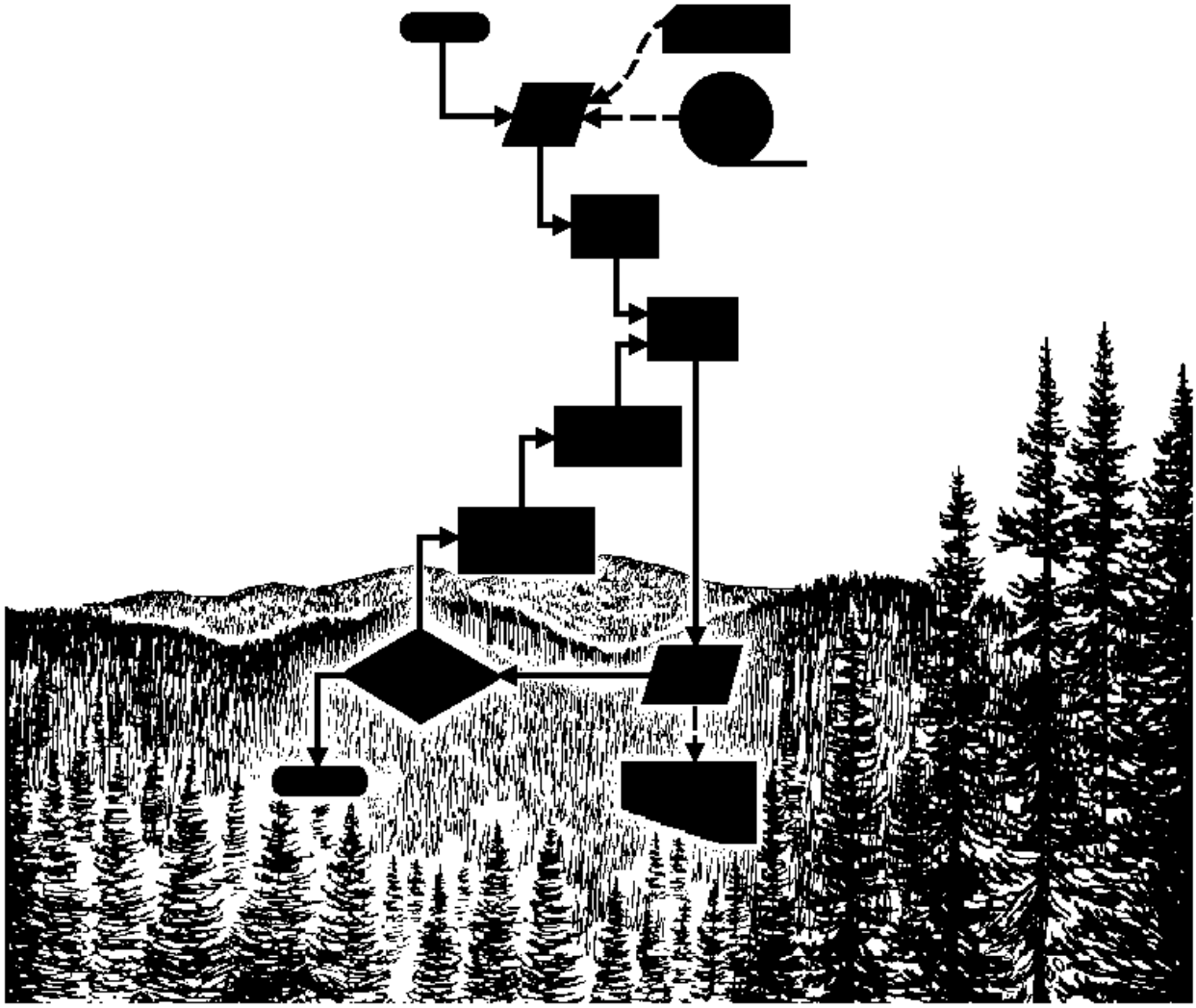
**Forest Management
Service Center**

Fort Collins, CO

July, 2001

Keyword Reference Guide for the Forest Vegetation Simulator

Compiled by
Michael G. Van Dyck



Keyword Reference Guide
for the
Forest Vegetation Simulator

CONTENTS

Keyword Groups

PROGRAM CONTROL

COMPRESS	NOTRIPLE	RANNSEED	STOP
DEBUG	NUMCYCLE	RESETAGE	STRCLASS
NOAUTOES	NUMTRIP	STATS	TIMEINT
NOTREES	PROCESS		

STAND AND TREE INFORMATION

COMMENT	INVYEAR	SDIMAX	STDIDENT
DESIGN	MGMTID	SITECODE	STDINFO
GROWTH	MODTYPE	SPCODES	TREEFMT

GROWTH AND MORTALITY MODIFIERS

BAIMULT	FIXHTG	NOCALIB	REGDMULT
BAMAX	FIXMORT	NOHTDREG	REGHMULT
CRNMULT	HTGMULT	READCORD	SDIMAX
DGSTDEV	HTGSTOP	READCORH	SERLCORR
FERTILIZ	MANAGED	READCORR	TOPKILL
FIXDG	MORTMULT		

THINNING KEYWORDS

CUTEFF	SPECPREF	THINAUTO	THINHT
CUTLIST	TCONDMLT	THINBBA	THINPRSC
MINHARV	THINABA	THINBTA	TOPKILL
PRUNE	THINATA	THINDBH	YARDLOSS

VOLUME CONTROLS

BFDEFECT	BFVOLUME	MCDEFECT	MINHARV
BFFDLN	CFVOLEQU	MCFDLN	VOLUME
BFVOLEQU			

INPUT/OUTPUT CONTROL KEYWORDS

ADDFILE	CUTLIST	NOTREES	STRCLASS
CALBSTAT	DEBUG	OPEN	SVS
CHEAPO	DELOTAB	SCREEN	TREEDATA
COMMENT	ECHOSUM	SPCODES	TREEFMT
CLOSE	FVSSTAND	STATS	TREELIST
COMPUTE	MGMTID	STDIDENT	

EXTENSIONS*

CHEAPO	END	FMIN	NOAUTOES
COMPUTE	ENDIF	IF	THEN
COVER	ESTAB		

*For CHEAPO II keywords refer to GTR-INT-211 (*User's Guide to CHEAPO II* ...)
For Event Monitor keywords refer to GTR-INT-275 (*User's Guide to the Event Monitor* ...)
For COVER keywords refer to GTR-INT-190 (*Cover: A User's Guide* ...)
ESTAB keywords are in a section at the end of this guide.

Keyword Introduction

Users communicate much of the information used by the Forest Vegetation Simulator (FVS) through the keyword system. This system consists of a set of mnemonic words (keywords) and associated data. A single keyword and its associated numeric data make up a keyword record.

Keyword Records

A simulation file is comprised of a logical set of keyword records. The keyword always begins in the first column of the keyword record. Depending on the keyword, up to seven additional fields on the record may be used to transmit data. These fields are referred to as parameter fields and the data that they contain are used when the option is implemented. Each parameter field consists of 10 columns. If a decimal point is included in numeric data, the parameter may be entered anywhere within the field. If integer values or alphanumeric data are used, they must be right-justified. The first ten columns of the keyword record are reserved for the keyword name, therefore the first parameter field begins in column 11 (fig. 1)

```
                                    Columns
         1         2         3         4         5         6         7         8
....:....0....:....0....:....0....:....0....:....0....:....0....:....0....:....0

DESIGN             0       1.0       999         5         0       16.       100
SITECODE           3        82
THINBTA         2002       8.0      24.0       1.0        PP        50         0
```

Figure 1 — Example of a portion of a simulation file showing keyword records with keywords (columns 1 to 10) and up to 7 parameter fields (10-column fields beginning in column 11). The header with column designations is not part of the file and is included here only to help illustrate the format of the keyword records.

A simplifying feature of the keyword system is that default values exist for almost all program options. Keywords need only be used if the desired action differs from the default action. similarly, most parameters associated with keywords have default values. If such a field is left blank, the default value will be used.

Many keywords contain a “year or cycle” parameter field. If the value entered in this field is in the range 0-40 it is interpreted as a cycle number. If the value entered is 1000 or greater it is interpreted as a year. No other values are legal for this type of parameter field unless otherwise noted.

Many keywords contain a “species” parameter field. Values entered in this field may be numeric or alpha codes. A numeric entry is interpreted as the species sequence number from the FVS variant that is being used. Alpha entries are interpreted as the alpha species code from the FVS variant that is being used. Refer to Appendix A for a list of species sequence numbers and species alpha codes.

Supplemental Records

The final element of the keyword system is the supplemental data record. These records are required when the information needed does not fit the parameter field format. Supplemental data records are a maximum of 80 characters and occupy the records immediately following the keyword record. The exact format of the supplemental data records is dependent on the keyword selected, and will be described in the keyword description for the keywords that require them (fig. 2).

```
COMMENT
Supplemental records are at most 80 characters wide and begin on the record
that follows the keyword record.  Syntax is unique to the keyword.
END
STDIDENT
0470003  Stand 002047.0003 at Clear Creek
```

Figure 2 — Example of a portion of a simulation file showing keywords with associated supplemental data records.

PARMS Format

Many of the "activity" keyword records may be coded using the PARMS format. This is a special form of the keyword record. It is equivalent to the standard form of the keyword record, but it allows expressions in place of constant parameters. See the individual keyword descriptions to determine whether a particular keyword may use the PARMS format.

When using the PARMS format for a keyword record, the keyword is coded in the first eight columns, and the year/cycle (field 1) is coded right justified in column 20 as is done when this feature is not used. The remainder of the record is coded

PARMS ($parameter_2$, $parameter_3$, $parameter_4$, ... , $parameter_n$)

where the word PARMS begins somewhere in columns 21 through 30. Each "$parameter_n$" corresponds to the n^{th} field of the keyword. Its value is represented by an expression that uses constants, variables (Event Monitor pre-defined or user-defined), and/or Event Monitor functions. Refer to GTR INT-275, *User's Guide to the Event Monitor: Part of Prognosis Model Version 6* for a discussion of legal uses of variables, operators, and functions. If the keyword record is long, an ampersand (&) is used to continue the record on the following line. Figure 3 shows several keyword records that use the PARMS format.

```
                                    Columns
        1         2         3         4         5         6         7         8
....:....0....:....0....:....0....:....0....:....0....:....0....:....0....:....0

THINDBH         2010     PARMS(10.0, 999.0, 1.0, 0.0, 0.0, 0.0)
THINDBH         2010      10.0     999.0       1.0       0.0       0.0       0.0
THINBTA         2020     PARMS(BTPA-SPMCDBH(1,0,3), 1.0, 0.0, 999.0, 0.0, 999.0)
```

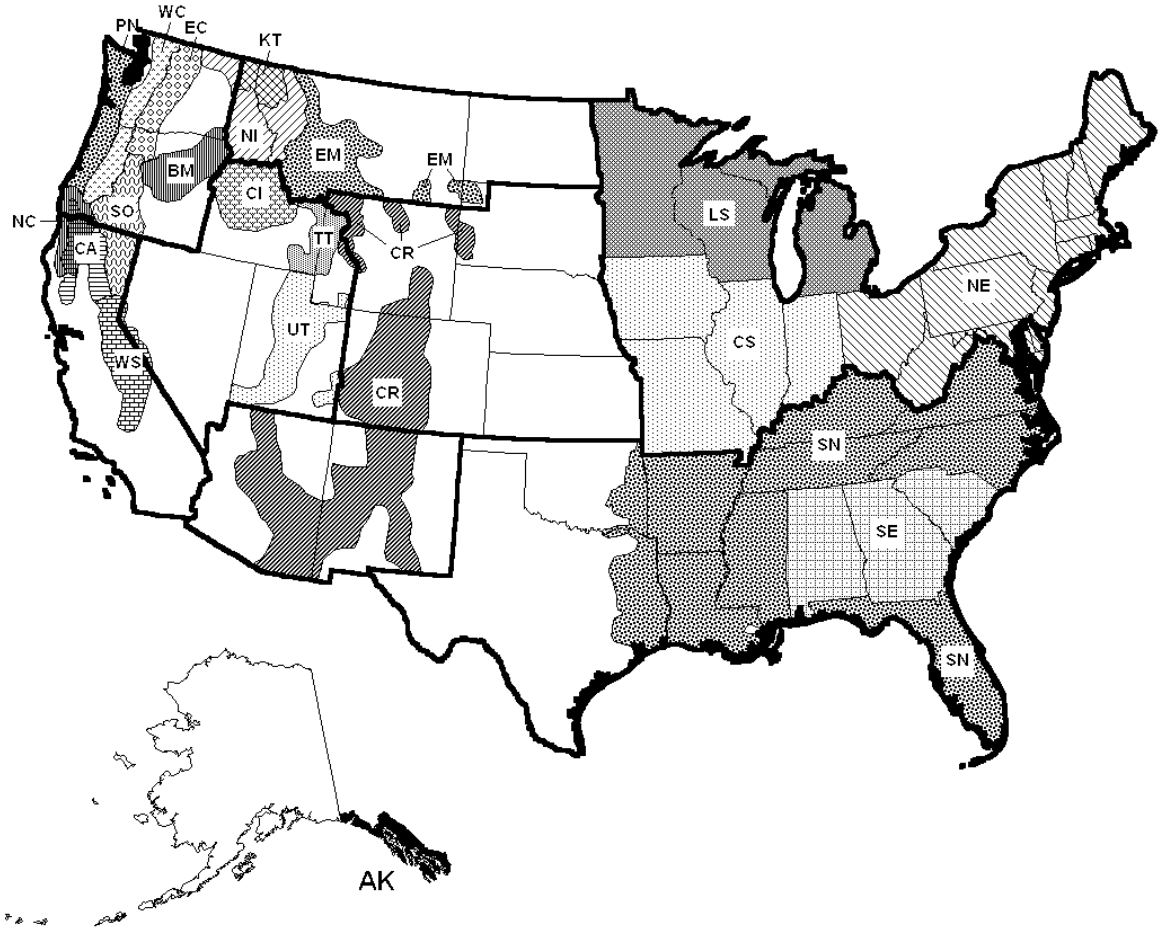
Figure 3 — Example of keyword records using the PARMS format. The two THINDBH keyword records are equivalent. For the THINBTA keyword the residual stand density (field 2) is calculated using a pre-defined variable (BTPA) and an Event Monitor function (SPMCDBH).

When using the PARMS format, supply all of the parameters used by the keyword. Defaults are not used when parameters are left blank Ensure that all parameter values are within legal limits as FVS does not check for legal values when the PARMS format is used. Also ensure that variables are defined when the activity is called. If the PARMS function references a variable that is not defined when the activity is called, the activity is canceled.

Geographic Variants

The different versions of the FVS model have been calibrated to specific geographic areas, and are referred to as "variants" (fig. 4). Each variant is actually a stand-alone application that contains growth parameters and other parameters based on data collected in the geographic area represented. The Central Rockies (CR) variant is unique in that it is comprised of submodels based on major forest type, each of which contains its own set of parameters. Individual variants may have a different subset of legal keywords, and may use different species codes than other

variants. Refer to individual keyword descriptions for a list of the variants for which use of the keyword is valid. Refer to Appendix A for a list of the valid species codes for each variant.



AK	Southeast Alaska, Coastal BC (SEAPROG)	NE	Northeast
BM	Blue Mountains	NI	Northern Idaho (Inland Empire)
CA	Inland CA, Southern Cascades (ICASCA)	PN	Pacific Northwest Coast
CI	Central Idaho	SE	Southeast
CR	Central Rockies*	SN	Southern
CS	Central States	SO	South Central OR, Northeast CA (SORNEC)
EC	Eastside Cascades	TT	Tetons
EM	Eastern Montana	UT	Utah
KT	Kootenai/Kaniksu/Tally Lake (KOOKANTL)	WC	Westside Cascades
LS	Lake States	WS	Westside Sierra Nevada (WESSIN)
NC	Northern California (Klamath Mountains)		

*Central Rockies Submodels:

SW	Southwest mixed conifers	SF	Spruce-fir
SP	Southwest ponderosa pine	LP	Lodgepole pine
BP	Black Hills ponderosa pine		

Figure 4 — Map of the geographic variants of the Forest Vegetation Simulator.

ADDFILE

(ADD a keyword FILE)
Variants: All
Related keywords: OPEN, CLOSE

Permits the adding of external keyword files to the simulation file. When FVS encounters an ADDFILE keyword in a keyword file it opens the auxiliary keyword file (see OPEN keyword) and reads in the keywords from that file. It then reads in the remaining keywords from the original file. Any number of ADDFILE requests can be included in a single simulation file (however, each must be preceded by an OPEN keyword).

field 1: File reference number for the auxiliary keyword file (also known as an addfile). File reference numbers are a mechanism that FVS uses to keep track of external files. Numbers less than 30 are reserved for files that are currently used by FVS.

Note: Any number of ADDFILE keywords can be requested in a simulation file, however each ADDFILE keyword must be preceded by a corresponding OPEN keyword with the same file reference number.

Note: The ADDFILE and OPEN keyword combination require that the auxiliary keyword file (or addfile) be read every time the simulation is run. This differs from using the "Insert From File" feature of the Suppose interface program. The Suppose program actually embeds the keywords from the auxiliary file into the current simulation file. Changing the auxiliary keyword file after it has been embedded into the current simulation file has no effect on the current simulation file. When using ADDFILE and OPEN keywords, changing the auxiliary file will cause a change in the simulation when it is run again.

Caution: ADDFILE should not be used within the auxiliary keyword file.

Example:

```
OPEN              40
EXTRA.KEY
ADDFILE           40
```

BAIMULT

(Basal Area Increment MULTiplier)
Variants: All
Related keywords: BAMAX, NOCALIB, CALBSTAT, READCORD, REGDMULT, FERTILIZ

Multiplier to change the large tree basal area increment prediction. This modifies the diameter growth rate of trees in the large tree model. The diameter break that separates the large and small tree models varies by variant (Refer to the variant overview).

field 1: Year or cycle in which the multiplier is applied. Once in effect it remains in effect until replaced by a subsequent multiplier. *Default = 0 (All cycles)*

field 2: Species code to which the multiplier is applied. *Default = All*

field 3: Multiplier value. (e.g. a value of 1.1 will increase the predicted basal area growth by 10%) *Default = 1.0 (no change from predicted value)*

Note: For any particular species this keyword remains in effect until a subsequent use of the keyword changes the multiplier for that species.

Note: The multiplier value itself remains constant over time, however this multiplier is applied after the scale factors have been applied. Scale factors may attenuate over time, therefore the modified basal area increment may also attenuate over time.

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

Caution: Many of the predictions in FVS are based on basal area increment. Changing the large tree basal area increment prediction also changes many of the other predictions made in the model.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 94

BAMAX

(Basal Area MAXimum)
Variants: All
Related keywords: BAIMULT, SDIMAX

Modifies the maximum density and the associated mortality pattern for the stand. In the CI variant, crown ratio change is also affected. In all variants other than CI, EM, KT, and NI, BAMAX is used indirectly to set species SDI maximums if the SDIMAX keyword has not been used for that purpose.

field 1: Maximum basal area (square feet) per acre.
Defaults by variant: *CI = 220*
NI, KT = 310[a]
EM = 500

[a]*BA maximums for NI and KT are assigned by habitat type. 310 is the default for habitat type 260.*

Habitat Code	*BAMax*	*Habitat Code*	*BAMax*
130	*140*	*550*	*500*
170	*220*	*570*	*390*
250	*250*	*610*	*390*
260	*310*	*620*	*440*
280	*240*	*640*	*180*
290	*270*	*660*	*290*
310	*310*	*670*	*400*
320	*310*	*680*	*350*
330	*200*	*690*	*390*
420	*310*	*710*	*260*
470	*290*	*730*	*220*
510	*330*	*830*	*220*
520	*380*	*850*	*160*
530	*440*	*999*	*300*

Caution: Use of this keyword can drastically change predicted yields.

Note: This keyword is processed before any tree data is read. If after reading the tree data it is found that the stand is above 85% of the BAMAX value, the maximum basal area will be automatically recalculated without regard to the value set with this keyword.

Note: In all variants other than NI, KT, and CI, if both BAMAX and SDIMAX are specified, the SDIMAX values will override the BAMAX values.

BFDEFECT (Board Foot DEFECT)

Variants: All
Related keywords: MCDEFECT, BFVOLUME, BFFDLN

Specifies species-specific board foot volume defect corrections for board foot volume estimates. In the eastern half of the US this keyword specifies defect for sawlogs and the sawlog portion of trees reported for pulpwood. (Defect for the remainder of the pulpwood is set using the MCDEFECT keyword.) Defect percentages are specified by species for the following five dbh's: 5, 10, 15, 20, 25 inches. For example, if the expected defect correction for a five-inch tree is 35 percent, a value of .35 would be entered in the keyword field 3. A linear interpolation function calculates the defect percentage for the specified dbh of the tree. For trees smaller than 5 inches dbh or greater than 25 inches dbh, a constant value for defect correction is applied based on the values in fields 3 and 7 respectively.

field 1: Year or cycle in which the defect corrections are to take effect. Once in effect it remains in effect until replaced by a subsequent multiplier.
Default = 0 (all cycles)

field 2: Species code that will be affected by the defect corrections.
Default = All

field 3: Board foot volume defect correction percentage for a 5-inch tree. All trees less than 5 inches dbh will be assigned this value of defect correction percentage.
Range: 0.0 - 1.0, Default = 0.0

field 4: Board foot volume defect correction percentage for a 10-inch tree.
Range: 0.0 - 1.0, Default = 0.0

field 5: Board foot volume defect correction percentage for a 15-inch tree.
Range: 0.0 - 1.0, Default = 0.0

field 6: Board foot volume defect correction percentage for a 20-inch tree.
Range: 0.0 - 1.0, Default = 0.0

field 7: Board foot volume defect correction percentage for a 25-inch tree. All trees greater than 25 inches dbh will be assigned this value of defect correction percentage. *Range: 0.0 - 1.0, Default = 0.0*

Note: For any particular species this keyword remains in effect until a subsequent use of the keyword changes the multiplier for that species.

Note: If used inside an Event Monitor sequence, BFDEFECT will not affect cycle 0 volumes.

Note: The PARMS format may be used with this keyword. In the PARMS format, however, 0 (zero) may not be used in the year/cycle field, and hence the defect will not affect cycle 0 volumes. See the introduction for a description of this format.

BFFDLN

(Board Foot Form and Defect Log linear equation)
Variants: All
Related keywords: MCFDLN, BFDEFECT, BFVOLEQU, BFVOLUME

Sets species specific parameters for a log-linear form and defect correction equation for board foot volume estimates:

$$\ln(V_s) = a_0 + a_1 \ln(V_0)$$

where V_s = board foot volume corrected for form and defect
V_0 = uncorrected board foot volume
a_0 = intercept (field 2 value)
a_1 = slope coefficient (field 3 value)

field 1: Species code whose equation is to be changed. *Default = All*

field 2: Intercept term for log-linear equation (a_0). *Default = 0*

field 3: Slope coefficient for log-linear equation (a_1). *Default = 1*

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 24

BFVOLEQU

(Board Foot VOLume EQUation)
Variants: All
Related keywords: BFVOLUME, BFDEFECT, BFFDLN

Sets species specific parameters for the board foot volume equation:

$$V = b_0 + b_1 D + b_2 DH + b_3 D^2 H + b_4 D^{b5} H^{b6}$$

where V = board foot volume
D = tree diameter at breast height (dbh)
H = tree height

field 1: Species code whose equation is to be changed. *Default = All*

field 2: Transition size code. *Default = 0*
0 indicates that field 3 is based on DBH
1 indicates that field 3 is based on DBH^2H

field 3: Transition size. If DBH (or DBH^2H, based on the value in field 2) for a particular tree is less than this value, coefficients from the first supplemental record are used in the calculations. If greater than this value, coefficients from the second supplemental record are used.
Default = 20.5 (For PN and WC: default = 0.0)

Supplemental Records:
Small-tree coefficients b_0 to b_6 are entered in the first seven 10-column fields of the first supplemental record. Large-tree coefficients b_0 to b_6 are entered in the first seven 10-column fields of the second supplemental record.

Note: This keyword is only recognized if the BFVOLUME keyword is used and field 7 of the BFVOLUME keyword has a value of 2 or 7.

BFVOLUME (Board Foot VOLUME)

Variants: All
Related keywords: VOLUME, BFDEFECT, BFVOLEQU, BFFDLN

Sets the merchantability limits for board foot volume equations. In the eastern half of the US, this keyword sets the merchantability limits for sawlogs and the sawlog portion of trees reported for pulpwood. (The merchantability limits for the remainder of the pulpwood can be set with the VOLUME keyword.)

field 1: Year or cycle number in which merchantability limits are to take affect. Once in effect they remain in effect until replaced by subsequent limits.
Default = 0 (all cycles)

field 2: Species code for which the limits are to be changed. *Default = All*

field 3: Minimum merchantable DBH in inches.
Defaults by variant:

BM, CA, EC, EM, NI, KT, PN, WC	*7.0 (lodgepole pine: 6.0)*
CI, TT, UT	*8.0 (lodgepole pine: 7.0)*
AK	*9.0 (lodgepole pine: 8.0)*
NC, SO	*9.0*
WS	*10.0*
CS, LS, NE	*hardwoods: 11.0, softwoods: 9.0*
SE, SN	*hardwoods: 12.0,softwoods: 10.0*
CR	*region 3: 9.0, region 2: 11.0*
CR (Black Hills)	*8.0*

field 4: Minimum top diameter (inside bark (DIB) in the eastern US, outside bark (DOB) in the western US).
Defaults by variant:

BM, CA, EC, EM, KT, NI, PN, WC	*4.5*
AK, CI, NC, SO, TT, UT, WS	*6.0*
CR	*6.0 (Black Hills: 7.0)*
SE, SN	*hardwoods: 9.0, softwoods: 7.0 (This value is fixed in SE and SN. Changing it will cause reported board foot volumes to be zero.)*
CS, LS, NE	*hardwoods: 9.6, softwoods: 7.6*

field 5: Stump height in feet. *Default = 1.0*

field 6: Form class (Region 5 ignores this field). *Default = 80 (Region 6 defaults vary by forest, species and diameter class)*

field 7: Volume calculation method. *Default = 6 (CR in Region 3: default = 8)*

1 Kemp equations with Allen adjustments.
2 Kemp equations with Allen adjustments and Brickell small tree and variable top adjustments, or user defined equation if BFVOLEQU keyword is used.
3 Region 6 Eastside taper equations.
4 Region 6 Westside taper equations.
5 Western Sierra log rules.
6 National Volume Estimator Library equations.
7 User defined equation using the BFVOLEQU keyword.
8 Other volume equations:
AK *Bruce and Demars (old FVS) equations.*

CR	*Hann and Bare equations (region 2 forests use coefficients from the Cibola NF).*
CS, LS, NE	*TWIGS volume equations.*
NC, WS	*Western Sierra log rules.*

Caution: If an entry is made in field 7, it must agree with the entry in field 7 of the VOLUME keyword

Note: For any particular species this keyword remains in effect until a subsequent use of the keyword changes the limits for that species.

References: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 22
GTR INT-208, Supplement to the User's Guide..., p. 18

CALBSTAT

(CALiBration STATistics)
Variants: All
Related keywords: BAIMULT, NOCALIB, OPEN

Outputs calibration scale factors computed from the input data to a file for later processing. By default the output will be written to unit 13, which is the same unit used for the CHEAPO output. If desired, however, users can direct the output to a different file using a combination of the CALBSTAT and OPEN keywords.

field 1: File reference number for CALBSTAT output file. File reference numbers are a mechanism that FVS uses to keep track of external files. Numbers less than 30 are reserved for files that are currently used by FVS. *Default = 13*

Example sending output to new unit:

```
CALBSTAT          50
OPEN              50
CALIBRAT.TXT
```

Note: If using the Suppose interface program the CALBSTAT output file, by default, has the same base name as the simulation file with a *.chp* extension. This is the same file used, by default, for the CHEA PO output.

CFVOLEQU

(Cubic Foot VOLume EQUation)
Variants: All
Related keywords: BFVOLEQU, VOLUME, MCDEFECT, MCFDLN

Sets species specific parameters for the cubic foot volume equation:

$$V = b_0 + b_1D + b_2DH + b_3D^2H + b_4D^{b5}H^{b6}$$

where V = board foot volume
D = tree diameter at breast height (dbh)
H = tree height

field 1: Species code whose equation is to be changed. *Default = All*

field 2: Transition size code. *Default = 1 for PP, 0 otherwise (PN and WC: default = 0)*
0 indicates that field 3 is based on DBH
1 indicates that field 3 is based on DBH^2H

field 3: Transition size. If DBH (or DBH^2H, based on the value in field 2) for a particular tree is less than this value, coefficients from the first supplemental record are used in the calculations. If greater than this value, coefficients from the second supplemental record are used.
Default = 6000 for PP, 0 otherwise (PN and WC: default = 0)

Supplemental Records:
Small-tree coefficients b_0 to b_6 are entered in the first seven 10-column fields of the first supplemental record. Large-tree coefficients b_0 to b_6 are entered in the first seven 10-column fields of the second supplemental record.

Note: This keyword is only recognized if the VOLUME keyword is used and field 7 of the VOLUME keyword has a value of 1 or 7.

CHEAPO

(Computer Help for the Economic Analysis of Prognosis Output)
Variants: All
Related keywords: OPEN

Generates an output file required for subsequent execution of the CHEAPO II economic analysis program. By default the output will be written to unit 13, which is the same unit used for the CALBSTAT output. , If desired, however, users can direct the output to a different file using a combination of the CHEAPO and OPEN keywords.

field 1: File reference number for CHEAPO output file. File reference numbers are a mechanism that FVS uses to keep track of external files. Numbers less than 30 are reserved for files that are currently used by FVS. *Default = 13*

Example sending output to new unit:

```
CHEAPO              40
OPEN                40
CHEAPDAT.TXT
```

Note: If using the Suppose interface program the CHEAPO output file, by default, has the same base name as the simulation file with a *.chp* extension. This is the same file used, by default, for the CALBSTAT output.

References: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 86
GTR INT-211, User's Guide to CHEAPO II..., p. 21

CLOSE

(CLOSE a file)
Variants: All
Related keywords: OPEN

Closes a file that was opened using an OPEN keyword.

field 1: File reference number for the file to be closed. This number must match the file reference number from the appropriate OPEN keyword. File reference numbers are a mechanism that FVS uses to keep track of external files. Numbers less than 30 are reserved for files that are currently used by FVS.

COMMENT (insert COMMENTs)

Variants: All
Related keywords: END

Enters comments into the sequence of FVS keywords. The comments can be entered on as many supplemental records as desired. Signify the end of the comment with an END keyword. Including this set of keywords will not affect a simulation, however they are printed to the main FVS output file. Keywords contained in a COMMENT block are ignored in the simulation. To test the effects of omitting a keyword, a COMMENT keyword can be placed before it, and an END keyword can be placed after it.

No fields are associated with this keyword, however supplemental records are used.

Supplemental Record(s):

Comments are entered in Columns 1-80 on as many supplemental records as desired. The END keyword must follow the last supplemental record.

Example:

```
COMMENT
This is a comment.  Nothing placed
in here will affect the simulation.
END
```

Note: If using the Suppose interface program comments may be added using the "Edit Simulation Notes" feature accessible through the Extras menu.

COMPRESS (COMPRESS the treelist)

Variants: All
Related keywords: TREELIST, CUTLIST, NOTRIPLE, NUMTRIP

Reduces the number of tree records stored inside FVS. This is done automatically when room is needed to store new trees created by the Regeneration Establishment process. You can use this keyword manually to schedule the tree compression process. When there are many records in the treelist, the record compression algorithm can reduce the number of records while minimizing loss of within-stand variation in tree attributes that are important for increment prediction. As a result, the number of calculations required for the projection can be reduced without significant bias.

Two methods are used to form new tree records. First, groups are formed by finding the largest differences between trees. Then those groups with the greatest variation are split to form new groups. Field 3 controls the weight given to these methods.

field 1: Year or cycle in which the treelist will be compressed. *Default = 1*

field 2: Number of tree records that will remain following compression. *Default = 150*

field 3: Percentage of new records that will be determined by finding the largest differences between trees. Remainder of records will result from splitting the classes with the greatest variation. *Range: 0 - 100, Default = 50*

field 4: Debug flag. Any numeric entry in this field will cause (a great deal of) output to be printed for the compression algorithm. *Default = blank (no debug output)*

Note: If COMPRESS is specified for the first or second cycle, the tree records will be subsequently tripled unless NOTRIPLE or NUMTRIP is used to suppress the record tripling feature.

Caution: Compression can cause trees to loose their plot specific identity, as they may be combined with "like" trees from a neighbor plot.

References: GTR INT-208, Supplement to the User's Guide..., p. 19

COMPUTE

(COMPUTE variables)
Variants: All
Related keywords: END

The COMPUTE keyword is part of the FVS Event Monitor. It allows the user to define variables expressed as mathematical expressions containing constants, Event Monitor variables, Event Monitor functions, and variables previously defined using the COMPUTE keyword. The value of variables may depend on events such as harvest or mortality. Variables are defined using mathematical equations in supplemental records, which are up to 80 characters long. Each subsequent variable must be defined on a subsequent record. The END keyword must follow the last supplemental record.

field 1: Year or cycle in which the expressions are to be evaluated. Enter 0 (zero) to have the expressions evaluated for every cycle. *Default = 1*

Supplemental record(s):
Contains mathematical expressions that consist of a user-defined variable name on the left of the equal sign, and a value or expression that is already defined on the right of the equal sign. An END keyword must be included after the last supplemental record.

Note: Expressions may contain up to 200 characters. If an expression is too long to fit on a single 80-character record, use an ampersand (&) at the end of the record to indicate that the expression is continued on the next record.

Note: A variable name may no longer than eight characters and may not be a word that is reserved for use by FVS or the Event Monitor.

Note: A maximum of 200 variables may be computed for any simulation. This is the total number of all variables computed by all COMPUTE keywords.

Example:

```
COMPUTE            0
PI = 3.1416
REMVD_BA = BBA - ABA
DF_TPA = SPMCDBH(1,DF,0)
END
```

In the above example, BBA and ABA are Event Monitor variables, and SPMCDBH( ) is an Event Monitor function. (See GTR INT-275, User's Guide to the Event Monitor)

Reference: GTR INT-275, User's Guide to the Event Monitor..., p. 5

COVER

(initialize COVER extension)
Variants: BM, CI, EC, EM, KT, NC, NI, SO, TT, UT, WS
Related keywords: END

Signifies the beginning of keywords for the Cover extension. The Cover extension has its own unique set of keywords (see GTR INT-190, Cover: A User's Guide...) The COVER keyword

sequence must be terminated with an END keyword. All keywords between COVER and END are considered Cover extension keywords.

field 1: Year or cycle in which COVER calculations begin. COVER calculations will also be performed in all cycles after the one specified. *Default = 1*

field 2: File reference number for COVER output file. If this field is left blank the COVER report will be written to the FVS output file. If the value is any number other than 16 or blank, then an associated COVER output file needs to be opened with OPEN keyword. *Default = 16*

Note: When using the Suppose interface program, the END keyword that terminates the cover keyword sequence is included automatically.

Example sending output to new unit:

```
OPEN              36
COVER.OUT
COVER              0         36
END
```

References: GTR INT-190, Cover: A User's Guide..., p. 14
GTR INT-208, Supplement to the User's Guide..., p. 18

CRNMULT

(CRowN change MULTiplier)
Variants: All except CI, KT, and NI
Related keywords: HTGMULT, HTGSTOP, PRUNE

Alters the change in crown ratio by a specified proportion. In the case of crown dubbing (generating values for missing crown ratio data), the dubbed crown ratio is adjusted by the specified proportion.

field 1: Year or cycle in which the multiplier is applied. Once in effect it remains in effect until replaced by a subsequent multiplier. *Default = 1*

field 2: Species code to which the multiplier is applied. *Default = All*

field 3: Multiplier value. For example, a value of 1.1 will make the crown ratio change 10% greater. A tree that had a crown ratio going from 90 to 80 (a 10% change) would now have a crown going from 90 to 79 (an 11% change, or 1.1 times the original change). When applied to dubbed crowns, the initial crown ratio is multiplied by this value. *Default = 1.0*

field 4: Minimum dbh in inches (greater than or equal to) to which the multiplier is applied. *Default = 0.0*

field 5: Maximum dbh in inches (less than) to which the multiplier is applied. Default = 999.0

field 6: Dubbing flag. *Default =0*

0	Applied to the crown change and dubbed crowns.
Positive number	Applied to dubbed crowns only.

Note: For any particular species this keyword remains in effect until a subsequent use of the keyword changes the multiplier for that species.

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

CUTEFF

(CUTting EFFiciency)
Variants: All
Related keywords: THINxxx

Sets the proportion of trees represented by a tree record that can be removed in any thinning. For example, if a tree record that is designated for removal in a thinning represents 200 trees per acre and the cutting efficiency is set to 0.8, 160 trees per acre (80%) will be removed from that record leaving 40 trees per acre standing. The CUTEFF keyword alone does not remove trees. It must be followed by one or more thinning keywords that, in conjunction with the CUTEFF keyword, determine the number of trees to be removed from each tree record.

field 1: Cutting efficiency. This is the proportion of the sample trees represented by a record that is removed if a tree is designated for removal in a thinning. *Range: 0.01 - 1.0, Default = 1.0*

Note: Keyword order is important. The cutting efficiency specified on a CUTEFF keyword only applies to thinning keywords that follow the CUTEFF keyword.

Note: Multiple CUTEFF keywords can be included in a keyword set.

Note: There is also a cutting efficiency parameter on each thinning request keyword. If a value is specified as part of a thinning request, it only applies to that thinning request. If a value is not supplied with the thinning request, the cutting efficiency parameter associated with the CUTEFF keyword will be used.

References: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 21
GTR INT-208, Supplement to the User's Guide..., p. 15

CUTLIST

(CUT tree tree LIST)
Variants: All
Related keywords: TREELIST, FVSSTAND, THINxxx, OPEN

Prints a list of all harvested tree records to an output treelist file. CUTLIST output is integrated into the same output file produced using the TREELIST keyword.

field 1: Year or cycle in which cut list is to be printed. Enter 0 (zero) to print output for every cycle in which a thinning occurs. *Default = 1*

field 2: File reference number for the output file. File reference numbers are a mechanism that FVS uses to keep track of external files. Numbers less than 30 are reserved for files that are currently used by FVS. *Default = 3*

field 3: Value to determine which header will be printed with the cut list. *Default = 0*

1	Encoded header record (machine readable, -999)
0	Header records describing each column (human readable)
-1	Suppress all headers

field 4: *Not used*

field 5: *Not used*

field 6: Cutlist format. *Default = 0*

0 Current format
1 Old version 6.1 format

Note: If the CUTLIST output is intended for use with post-processing programs, it must contain headers and be in the current format (i.e. field 3 must be 0, 1, or blank, and field 6 must be 0 or blank).

Note: If using the Suppose interface program the CUTLIST output file, by default, has the same base name as the simulation file with a *.trl* extension. This is the same file used, by default, for the TREELIST output.

References: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 21
GTR INT-208, Supplement to the User's Guide..., p. 15

DEBUG

(print DEBUG output)
Variants: All
Related keywords: OPEN

Used to request printing of program calculations as they occur. DO NOT use this keyword unless you have a good reason because a tremendous amount of output results.

field 1: Cycle for which full program debug output is requested. If blank, debug output will be printed for all cycles. *Default = All*

field 2: If debugs are desired for specific subroutines, a non-zero number is entered and the specific subroutines are listed on supplemental records. A blank or no entry will result in debugs for all subroutines. *Default = All*

field 3: File reference number for DEBUG output file. File reference numbers are a mechanism that FVS uses to keep track of external files. Numbers less than 30 are reserved for files that are currently used by FVS. The default is to send the output to unit 16, which is the main FVS output file. *Default = 16*

Caution: This keyword generates a tremendous amount of output.

DELOTAB

(DELete Output TABles)
Variants: All

Used to selectively delete tables that are, by default, part of the standard FVS output.

field 1: Code for table that is to be deleted. *Default = blank (no tables deleted)*

1 = delete the stand composition table.
2 = delete the selected sample tree table.
3 = delete the summary statistics table.

NOTE: Multiple DELOTAB keywords are required to delete two or more portions of the FVS output.

NOTE: If field one is blank, the Standard FVS output will be produced.

DESIGN

(sampling DESIGN)
Variants: All
Related keywords: STDINFO, STDIDENT

Specifies information about the sampling design used to collect tree data.

field 1: A positive value is interpreted as a basal area factor for horizontal angle gauge (prism). A negative value is interpreted as the inverse of a large-tree fixed area plot. *Default = 40*

field 2: Inverse of the small-tree fixed area plot (e.g. if the fixed area plot is 1/100 acre, enter 100 in this field). *Default = 300*

field 3: Break point diameter in inches. Any trees smaller than this diameter were sampled using the small-tree fixed area plots. Trees with diameters greater than or equal to this diameter were sampled using the specified BAF or large-tree fixed area plots. *Default = 5.0*

field 4: Number of plots in the stand. If blank or 0 (zero), the number of plots in the stand is determined by counting the numbers of unique plot identification codes on the tree record data. *Default = blank (FVS count)*

field 5: Number of nonstockable plots in the stand (e.g. plots fell on a road or rock outcrop). If blank, count nonstockable plots on tree records (value class = 8). *Default = blank (FVS count)*

field 6: Sampling weight (usually acres) for the stand. This weight does not affect the projection, but is used in programs that aggregate projections to produce a composite yield table. *Default = blank (number of plots)*

field 7: Proportion of the stand considered stockable. A value entered in this field will override the calculation based on number of plots stockable versus total number of plots. *Range: 0.0 - 1.0, Default = 1.0*

Note: The Suppose interface program automatically includes a DESIGN keyword based on the stand and plot data in the stand list file. To override any field of the Suppose-generated DESIGN keyword, only enter values in the fields that are to be overridden.

References: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 10
GTR INT-208, Supplement to the User's Guide..., p. 15

DGSTDEV

(Diameter Growth STandard DEViation)
Variants: All
Related keywords: NUMTRIP, NOTRIPLE

Changes the limits of the normal distribution from which random errors are drawn for diameter increment predictions. This region is, by default, bounded by ±2 standard deviations.

field 1: Number of standard deviations that defines the bounds of distribution. If set to a value less than 1.0, random error will be completely suppressed. *Default = 2.0*

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 93

ECHOSUM

(ECHO the SUM mary table)
Variants: All
Related keywords: CALBSTAT

Specifies that the summary statistics table from the standard FVS output file be written to a separate file. The summary statistics table will still be written to the standard FVS output file.

No fields are associated with this keyword.

Note: This keyword is required in order to use the "Average Summary Table" post processor. This post processor uses the ECHOSUM output file as input.

Note: If using the Suppose interface program the ECHOSUM output file, by default, has the same base name as the simulation file with a *.sum* extension.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 48

END

(END special sequence)
Variants: All
Related keywords: COMMENT, COMPUTE, COVER, ESTAB, FMIN, OPEN

Signifies the end of a special keyword sequence. Essentially, the END keyword returns control of the simulation to the base FVS system after an extension (such as the Establishment Model) has been called.

No fields are associated with this keyword.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 85

ENDIF

(END an IF-then block)
Variants: All
Related keywords: IF, THEN

Signifies the end of an Event Monitor IF-THEN block. Activities that follow the ENDIF keyword are scheduled normally.

No fields are associated with this keyword.

Note: When using the Suppose interface program, the ENDIF keyword will be added automatically whenever the keyword is correctly scheduled "by condition" using a keyword window.

Reference: GTR INT-275, User's Guide to the Event Monitor..., p. 2

ESTAB

(ESTABlishment model)
Variants: All
Related keywords: END

Signifies the beginning of keywords for the Regeneration Establishment extension. This extension has its own unique set of keywords (see the Establishment keyword descriptions at the end of this guide, and GTR INT-279, User's Guide to the Regeneration Establishment Model...) The ESTAB

keyword sequence must be terminated with an END keyword. All keywords between ESTAB and END are considered Establishment extension keywords.

field 1: Year or cycle of disturbance or beginning of regeneration. The seedling tally sequence will begin in this year. *Default = 0 (all cycles)*

Caution: Some care is necessary when entering a disturbance date to insure that the regeneration establishment model is called at the correct time. Pay close attention to cycle boundaries when entering disturbance date.

Caution: If the ESTAB keyword is embedded in an event monitor sequence, year of disturbance (field 1) is interpreted as years from the time the condition is true until establishment, or in other words, a lag time. (e.g. a 5 in field 1 means wait 5 years after condition is true to establish the stand.)

Note: The Regeneration Establishment extension keyword sequence must begin with an ESTAB keyword and end with an END keyword; all keywords contained within this sequence are considered Regeneration Establishment keywords.

References: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 86
GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 11

FERTILIZ

(FERTILIZe)
Variants: All
Related keywords: HTGMULT, BAIMULT

Simulates application of fertilizer to the stand. Rates of application can be entered for nitrogen, phosphorus, and potassium. Currently, however, only applications of 200 pounds of nitrogen per acre are represented by the model. User supplied rates for all three nutrients are ignored.

field 1: Year or cycle of fertilizer application. *Default = 1*

field 2: Rate of application for nitrogen in pounds per acre. *Currently fixed at 200*

field 3: Rate of application for phosphorus in pounds per acre. *Currently fixed at 0*

field 4: Rate of application for potassium in pounds per acre. *Currently fixed at 0*

field 5: Multiplier for modifying the predicted response to fertilizer application (e.g. 1.1 results in a 10% increase over the predicted fertilization response). *Default = 1.0*

Note: The effects are based on data from northern Idaho.

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

Caution: If this keyword is embedded in an event monitor sequence, field 1 is interpreted as years from the time the event is true until implementation, or in other words, a lag time. (e.g. a 5 in field 1 means wait 5 years after event is true to fertilize the stand.)

FIXDG

(FIXed Diameter Growth)
Variants: All
Related keywords: BAIMULT, DGSTDEV, READCORD, REGDMULT

Multiplier used to modify the diameter growth rate of the specified species within the specified diameter range. This modifier is applied after growth prediction calculations, therefore adjusting the diameter growth will not affect height growth for that cycle. However, the changed diameter growth and resulting change in basal area will affect mortality that cycle.

field 1: Year or cycle in which the multiplier is applied. Enter 0 (zero) to affect all cycles. *Default = 1*

field 2: Species code to which the multiplier will be applied. *Default = All*

field 3: Multiplier value. (e.g. a value of 1.1 will increase the predicted diameter growth by 10%) *Range: 0.0 - 999.0, Default = 1.0 (no change from predicted value)*

field 4: Minimum dbh in inches (greater than or equal to) to which the mortality rate will be applied. *Default = 0.0*

field 5: Maximum dbh in inches (less than) to which the mortality rate will be applied. *Default = 0.0*

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

Caution: Many of the predictions in FVS are based on diameter increment. Changing the diameter increment prediction also changes many of the other predictions made in the model.

Caution: If this keyword is embedded in an event monitor sequence, field 1 is interpreted as years from the time the event is true until implementation, or in other words, a lag time. (e.g. a 5 in field 1 means wait 5 years after event is true to apply the mortality.)

FIXHTG

(FIXed HeighT Growth)
Variants: All
Related keywords: HTGMULT, HTGSTOP, READCORH, READCORR, REGHMULT

Multiplier used to modify the height growth rate of the specified species within the specified diameter range. This modifier is applied after growth prediction calculations, therefore adjusting the height growth will not affect diameter growth for that cycle. However, the changed height growth and resulting change in relative crown positions will affect mortality that cycle.

field 1: Year or cycle in which the multiplier is applied. Enter 0 (zero) to affect all cycles. *Default = 1*

field 2: Species code to which the multiplier will be applied. *Default = All*

field 3: Multiplier value. (e.g. a value of 1.1 will increase the predicted height growth by 10%) *Range: 0.0 - 999.0, Default = 1.0 (no change from predicted value)*

field 4: Minimum dbh in inches (greater than or equal to) to which the mortality rate will be applied. *Default = 0.0*

field 5: Maximum dbh in inches (less than) to which the mortality rate will be applied. *Default = 0.0*

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

Caution: If this keyword is embedded in an event monitor sequence, field 1 is interpreted as years from the time the event is true until implementation, or in other words, a lag time. (e.g. a 5 in field 1 means wait 5 years after event is true to apply the mortality.)

FIXMORT

(FIXed MORTality)
Variants: All
Related keywords: MORTMULT, BAMAX, SDIMAX

Induces mortality of a fixed proportion of the trees per acre represented by tree record of the specified species and within the specified diameter range. This can replace the predicted mortality or be in addition to the predicted mortality, or the effective mortality can be the larger of the two. For example, if a tree record represents 200 trees per acre of the designated species and within the specified diameter range, and the mortality rate is set to 0.3 and set to replace predicted mortality, 60 trees per acre (30%) from that record will die strictly due to this keyword.

field 1: Year or cycle in which specified mortality rate is to take effect. Enter 0 (zero) to affect all cycles. *Default = 1*

field 2: Species code to which mortality rate will be applied. *Default = All*

field 3: Proportion of the tree record that will be killed *Range: 0.0 - 1.0, Default = 0.0*

field 4: Minimum dbh in inches (greater than or equal to) to which the mortality rate will be applied. *Default = 0.0*

field 5: Maximum dbh in inches (less than) to which the mortality rate will be applied. *Default = 0.0*

field 6: Effective mortality. *Default = 0*

0	Replaces the mortality rate calculated in the model.
1	Added to the mortality rate calculated in the model.
2	Compared to the mortality rate calculated in the model and the larger value is used.

field 7: Mortality distribution. *Default = 0*

0	Mortality applied uniformly throughout the stand.
1	Mortality applied on a point basis.

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

Caution: This keyword may override BAMAX and SDIMAX related mortality.

Caution: If this keyword is embedded in an event monitor sequence, field 1 is interpreted as years from the time the event is true until implementation, or in other words, a lag time. (e.g. a 5 in field 1 means wait 5 years after event is true to apply the mortality.)

FMIN

(Fire Model INitialization)
Variants: All
Related keywords: END

Signifies the beginning of keywords for the Fuels and Fire Effects extension. This extension has its own unique set of keywords. The FMIN keyword sequence must be terminated with an END keyword. All keywords between FMIN and END are considered Fire extension keywords.

No fields are associated with this keyword.

FVSSTAND

(FVS STAND tables)
Variants: All
Related keywords: TREELIST, CUTLIST

Generates an output file specifically for running the FvsStand post processor. The post processor generates stand and stock tables in a variety of formats. The output file format is similar to that of the TREELIST and CUTLIST keywords. In addition FVSSTAND output files contain stand structure and age data, as well as past tree measurement data.

field 1: Cycle or year in which the output is to be printed. Enter 0 (zero) to print output for all cycles. *Default = 1*

field 2: Printing of treelist information. This field only has effect on the output if field 1 is 1 or the beginning year of the simulation. *Default = 0*

0	Print cycles 0 and 1
1	Print only cycle 1, suppress cycle 0
2	Print only cycle 0, suppress cycle 1

Note: Use of this keyword does not automatically start the FvsStand post processor program.

Note: The FVSSTAND output file has the same base name as the simulation file with a *.fst* extension.

GROWTH

(GROWTH measurement method)
Variants: All

Specifies the methods used to measure and input diameter growth, height growth and mortality data. This information is used by FVS to determine how to interpret the diameter increment, height increment, and tree history fields of the input tree data. Growth estimates can be either directly measured or computed as the difference between two successive diameter or height measurements. Furthermore, the values for diameter and height can describe the tree at either the start or the end of the growth period.

field 1: Method used to measure diameter growth. *Default = 0*

0	Measured directly (e.g. increment core). Current diameter represents a measurement at the end of growth measurement period, and diameter increment represents previous growth.
1	Subsequent measurement. Current diameter represents a measurement at the end of the growth measurement period, and diameter increment represents a total diameter measurement at the beginning of the growth measurement period.

2 Measured directly (e.g. increment core). Current diameter represents a measurement at the beginning of growth measurement period, and diameter increment represents subsequent growth.

3 Subsequent measurement. Current diameter represents a measurement at the beginning of the growth measurement period, and diameter increment represents a total diameter measurement at the end of the growth measurement period.

field 2: Length of diameter growth measurement period in years. *Default = 10 (SN default = 5)*

field 3: Method used to measure height growth. *Default = 0*

0 Measured directly. Current height represents a measurement at the end of growth measurement period, and height increment represents previous growth.

1 Subsequent measurement. Current height represents a measurement at the end of the growth measurement period, and height increment represents a total height measurement at the beginning of the growth measurement period.

2 Measured directly. Current height represents a measurement at the beginning of growth measurement period, and height increment represents subsequent growth.

3 Subsequent measurement. Current height represents a measurement at the beginning of the growth measurement period, and height increment represents a total height measurement at the end of the growth measurement period.

field 4: Length of height growth measurement period in years. *Default = 5*

field 5: Length of the mortality observation period in years. *Default = 5*

Note: When diameter or height growth is to be computed as the difference between two successive measurements, the values recorded in the tree data file for diameter growth and/or height growth should be total heights and/or total outside bark diameters, not the difference between the two measurements.

Note: The Suppose interface program automatically includes a GROWTH keyword based on the appropriate fields in the stand list file if those values are other than the defaults.

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 20

HTGMULT

(HeighT Growth MULTiplier)
Variants: All
Related keywords: HTGSTOP, CRNMULT, READCORH, READCORR, NOTHDREG

Multiplier to change the large tree height increment prediction. This modifies the height growth rate of trees in the large tree model. The diameter break that separates the large and small tree models varies by variant (Refer to the variant overview).

field 1: Year or cycle in which the multiplier is applied. Once in effect it remains in effect until replaced by a subsequent multiplier. *Default = 1*

field 2: Species code to which multiplier is applied. *Default = All*

field 3: Multiplier value (e.g. 0.9 will decrease the predicted height growth to 90% of the predicted value). *Default = 1.0 (no change from predicted value)*

Note: For any particular species this keyword remains in effect until a subsequent use of the keyword changes the multiplier for that species.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 94

HTGSTOP

(HeighT Growth STOP)
Variants: All
Related keywords: TOPKILL, HTGMULT, CRNMULT

Stops or reduces height growth for randomly selected tree records that fall within the user-specified parameters for species and height.

field 1: Year or cycle in which height growth is to be stopped. *Default = 1*

field 2: Species code for which height growth is to be stopped. *Default = All*

field 3: Shortest tree in feet (greater than or equal) that will be affected. *Default = 0*

field 4: Tallest tree in feet (less than) that will be affected. *Default = 0*

field 5: Probability that a tree will not grow in height. *Range: 0.0 - 1.0, Default = 0.0*

field 6: Mean proportion of height growth retained (e.g. 0.8 will retain an average of 80% of the height growth on selected trees). *Default = 1.0*

field 7: Standard deviation of the distribution of the proportion of height growth retained. This allows for variability in height growth reduction among the selected trees. *Default = 0.0*

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

References: GTR INT-208, Supplement to the User's Guide..., p. 20

IF

(begin IF-then block)
Variants: All
Related keywords: THEN, ENDIF

Signifies the beginning of an Event Monitor IF-THEN block (also called scheduling by condition). The Event Monitor keyword sequence must begin with an IF keyword. The next record must be a condition statement that evaluates to true or false. The next record is a THEN keyword. The sequence ends with an ENDIF keyword. All keywords contained between the THEN and ENDIF keywords will be executed whenever the condition is true. The condition is checked every cycle, unless that cycle falls within the minimum waiting time since the last time the condition was true.

field 1: Minimum waiting time in years after the condition was found true before the condition will be evaluated again. Nothing in the IF-THEN block will occur

until after this period of time has passed since the condition was last found true, and at that point the condition will again begin to be evaluated.

Syntax: IF Minimum waiting time
Condition is true
THEN
Perform Activity
ENDIF

Example: If stand basal area exceeds 100 square feet per acre, thin the stand according to the THINDBH parameters. Once this condition is true, wait 30 years before checking the condition again:

```
IF              30
BBA GT 100
THEN
THINDBH          0        0       99      1.0        0        0        0
ENDIF
```

Caution: The year/cycle field on activity keywords changes meaning to become a delay period when the keywords are included in an Event Monitor IF-THEN block. Entering 2010 in the date field of an activity keyword that is in an IF-THEN block will cause a delay period of 2010 years.

Note: When using the Suppose interface program, scheduling by condition is accomplished by clicking the "Schedule by Condition" button in individual keyword windows, and then clicking the "Condition" button and selecting "Free Form" to set up the condition statement. The activity keyword that follows the THEN statement (the THINDBH keyword as shown in the example above) is not typed in explicitly, but is rather set up using the keyword window. When the condition statement has been typed in, the "OK" button is clicked to return to the keyword window to fill in the appropriate field values. The ENDIF keyword will be added automatically.

Reference: GTR INT-275, User's Guide to the Event Monitor..., p. 2

INVYEAR

(INVentory YEAR)
Variants: All
Related keywords: NUMCYCLE, TIMEINT

Specifies the starting year for a projection. The year entered is assumed to be the year that the stand was inventoried.

field 1: Starting year (4-digits) for the simulation (e.g. 1987). *Default = 0*

Caution: Any starting year may be used. Care must be taken to assure that the years for which options are requested fall within the range of dates defined by the parameters on the NUMCYCLE, TIMEINT and INVYEAR keywords.

Note: The Suppose interface program automatically includes an INVYEAR keyword based on the inventory year field in the stand list file. If this field is blank, Suppose will use the current year as the inventory year.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 8

MANAGED (MANAGED stand)

Variants: EM, KT, PN, SE, WC

Acts as a flag to signify that the stand is managed (e.g. a plantation) or unmanaged. Once set to "managed", it remains in effect until a subsequent use of the keyword sets it to "unmanaged". When the flag is set to "managed" (field 2 = 1), growth rates are modified in the particular model(s) listed below by variant.

Eastern Montana (EM)	Large tree diameter growth
Kookantl (KT)	Large tree diameter growth and small tree height growth
Pacific Northwest Coast (PN)	Small tree diameter growth
Southeast (SE)	Large tree diameter growth for species SP and LP
Westside Cascades (WC)	Small tree diameter growth

field 1: Year or cycle. *Default = 0 (all cycles)*

field 2: Management flag. *Default = 1*

0	Unmanaged
1	Managed

Note: If the MANAGED keyword is not present in the simulation, the stand is considered unmanaged.

MCDEFECT (Merchantable Cubic foot DEFECT)

Variants: All

Related keywords: BFDEFECT, MCFDLN, VOLUME

Specifies species-specific cubic-foot volume defect corrections for cubic foot volume estimates. In the eastern half of the US this keyword specifies defect only for the pulpwood that is smaller than the merchantable limits for sawlogs. (Defect for the sawlog portion of pulpwood trees is set using the BFDEFECT keyword.) Defect percentages are specified by species for the following five dbh's: 5, 10, 15, 20, 25+ inches. For example, if the expected defect correction for a five-inch tree is 35 percent, a value of .35 would be entered in field 3. A linear interpolation function calculates the defect percentage for the specified dbh of the tree. For trees smaller than 5 inches dbh or greater than 25 inches dbh, a constant value for defect correction is applied based on the values in fields 3 and 7 respectively.

field 1: Year or cycle in which the defect corrections are to take effect. Once in effect it remains in effect until replaced by a subsequent multiplier.
Default = 0 (all cycles)

field 2: Species code for which the defect corrections are to be applied.
Default = All

field 3: Cubic foot volume defect correction percentage for a 5-inch tree. All trees less than 5 inches dbh will be assigned this value of defect correction percentage.
Range: 0.0 - 1.0, Default = 0.0

field 4: Cubic foot volume defect correction percentage for a 10-inch tree.
Range: 0.0 - 1.0, Default = 0.0

field 5: Cubic foot volume defect correction percentage for a 15-inch tree.
Range: 0.0 - 1.0, Default = 0.0

field 6: Cubic foot volume defect correction percentage for a 20-inch tree. *Range: 0.0 - 1.0, Default = 0.0*

field 7: Cubic foot volume defect correction percentage for a 25-inch tree. All trees greater than 25 inches dbh will be assigned this value of defect correction percentage. *Range: 0.0 - 1.0, Default = 0.0*

Note: For any particular species this keyword remains in effect until a subsequent use of the keyword changes the multiplier for that species.

Note: If used inside an Event Monitor sequence, BFDEFECT will not affect cycle 0 volumes.

Note: The PARMS format may be used with this keyword. In the PARMS format, however, 0 (zero) may not be used in the year/cycle field, and hence the defect will not affect cycle 0 volumes. See the introduction for a description of this format.

MCFDLN

(Merchantable Cubic foot Form and Defect Log linear equation)
Variants: All
Related keywords: BFFDLN, MCDEFECT, CFVOLEQU, VOLUME

Sets species specific parameters for a log-linear form and defect correction equation for cubic foot volume estimates:

$$\ln(V_s) = a_0 + a_1 \ln(V_0)$$

where V_s = cubic foot volume corrected for form and defect
V_0 = uncorrected cubic foot volume
a_0 = intercept (field 2 value)
a_1 = slope coefficient (field 3 value)

field 1: Species code whose equation is to be changed. *Default = all*

field 2: Intercept term for log-linear equation (a_0). *Default = 0*

field 3: Slope coefficient for log-linear equation (a_1). *Default = 1*

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 24

MGMTID

(ManaGeMenT IDentification)
Variants: All

Specifies a 4-character alphanumeric code to identify the silvicultural treatment simulated in a projection. The code does NOT affect the projection, but is printed with each output table. When this keyword is not used, the code "NONE" is used.

No fields are associated with this keyword, however a supplemental record that contains the code entered in Columns 1-4 is required. When the supplemental record is blank, no code is printed.

Example:

```
MGMTID
ALT2
```

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 11

MINHARV

(MINimum HARVest)
Variants: All
Related keywords: THINxxx

Specifies minimum acceptable harvest standards for board-foot volume, merchantable cubic-foot volume, or basal area per acre. The accumulated removals across all thinnings in a cycle must exceed the standards for all the units of measure (fields 2, 3, and 4), or none of the thinnings in that cycle will be implemented.

field 1: Year or cycle in which minimum harvest standards will be applied. Once in effect, it remains in effect until a subsequent MINHARV keyword changes the standards. *Default = 1*

field 2: The minimum acceptable harvest volume in merchantable cubic-feet per acre. (Sawlog CF volume in eastern US variants) *Default = 0*

field 3: The minimum acceptable harvest volume in board-feet per acre. (Sawlog BF volume in eastern US variants) *Default = 0*

field 4: The minimum acceptable harvest in square feet of basal area per acre. Default = 0

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 22

MODTYPE

(MODel TYPE)
Variants: CR, SE
Related keywords: STDINFO

Specifies the variant's model type, the physiographic region and the forest type. This information allows FVS to use the appropriate model type, which is a sub-model built into the variant.

field 1: Model type.

CR variant:

1 = Southwest mixed conifers
2 = Southwest ponderosa pine
3 = Black Hills ponderosa pine
4 = Spruce-fir
5 = Lodgepole pine

Defaults in CR variant are by forest:	*Default*
All region 3 forests	*2*
Black Hills, Nebraska	*3*
Grand Mesa, Uncompahgre, Gunnison	*4*
Pike, San Isabel, White River	*4*
Rio Grande, San Juan	*4*
Bighorn, Medicine Bow, Routt	*5*
Arapaho, Roosevelt, Shoshone	*5*

SE Variant:

1 = SE TWIGS model type. *Default = 1*

field 2: Physiographic Region (SE variant only). Either the 3-character alpha code or the numeric code will work. *Default = 7*

1 = BLU (Blue Ridge Mountains)	5 = LPL (Limestone Plateau)
2 = CMP (Cumberland Plateau)	6 = MCP (Middle Coastal Plain)
3 = FCP (Flatlands Coastal Plain)	7 = PIE (Piedmont)
4 = HCP (Hilly Coastal Plain)	8 = VAL (Valley and Ridge)

field 3: Forest Type (SE variant only). *Default = 31*

4 = white pine	35 = redcedar
5 = loblolly pine plantation	36 = pond pine
6 = shortleaf pine plantation	38 = pitch pine
7 = longleaf pine plantation	40 = oak-pine
21 = longleaf pine	50 = oak-hickory
22 = slash pine	52 = chestnut oak
31 = loblolly pine	57 = southern scrub oak
32 = shortleaf pine	60 = oak-gum-cypress
33 = Virginia pine	70 = elm-ash-cottonwood

Note: In the CR variant this keyword has the same effect as field 2 of the STDINFO keyword. If both keywords are included in a simulation, the one that appears later in the simulation file will determine the model type.

Note: When using the CR or SE variants with the Suppose interface program, Suppose automatically includes a MODTYPE keyword. The field values are based on the model type, physiographic region, and forest type fields in the stand list file. If any of these fields are blank, the default values are used.

MORTMULT (MORTality MULTiplier)

Variants: All
Related keywords: FIXMORT, SDIMAX, BAMAX

Multiplier used to alter predicted mortality rate. In variants AK, BM, CA, CR, EC, EM, KT, NC, NI, PN, SO, TT, UT, and WS, the multiplier is applied to the predicted background mortality only, and density related mortality is unaffected. (Use SDIMAX to modify density related mortality.) In the other variants the multiplier is applied to all predicted mortality.

field 1: Year or cycle in which multiplier is applied. Once in effect, it remains in effect until replaced by a subsequent multiplier. *Default = 1*

field 2: Species code to which multiplier is applied. *Default = All*

field 3: Multiplier value. (e.g. a value of 1.1 will increase the predicted background mortality by 10%) *Default = 1.0 (no change from predicted value)*

field 4: Minimum dbh in inches (greater than or equal to) to which the mortality multiplier is applied. *Default = 0.0*

field 5: Maximum dbh in inches (less than) to which the mortality multiplier is applied. *Default = 999.0*

field 6: *No longer used.*

Note: Only one MORTMULT keyword can be specified for each species in any cycle.

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

References: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 94
GTR INT-208, Supplement to the User's Guide..., p. 17

NOAUTOES

(NO AUTOmatic ESTablishment)
Variants: All
Related keywords: ESTAB

Suppresses all natural regeneration and ingrowth features of the Regeneration Establishment model, including stump and root sprouting.

No fields are associated with this keyword.

Note: In the AK, CI, EM, KT, and NI variants, natural regeneration is automatically scheduled in a simulation after "significant" thinning events or in the absence of disturbance for a period of twenty years if the user schedules no regeneration. The NOAUTOES keyword cancels both types of automatic natural regeneration.

NOCALIB

(NO CALIBration scale factors)
Variants: All
Related keywords: BAIMULT

Suppresses calculation of scale factors for large-tree diameter increment model and small-tree height increment model. Calibration is the default mode of the system and each species is calibrated independently. For a particular species, if there are at least five large-tree diameter increment measurements or three small-tree height increment measurements, a scale factor will be calculated for that species and growth will be adjusted accordingly. This keyword suppresses all calibration for a species (or for all species), therefore tree growth will be exactly as predicted by the model in the absence of growth information.

field 1: Species code for which calculation of scale factors is to be suppressed.

Note: Non-calibration is appropriate when growth measured in the sample is not typical. This might be the case during insect epidemics or prolonged drought, which would tend to show artificially low growth rates. This might also be the case if only site trees were measured for growth, which would tend to show artificially high growth rates.

Reference: GTR INT-208, Supplement to the User's Guide..., p. 11

NOHTDREG

(NO HeighT-Diameter REGression)
Variants: All
Related keywords: HTGMULT, READCORH

Suppresses the calibration of coefficients for height-diameter equations based on input tree data. Height-diameter equations are used in dubbing the heights of trees that have missing recorded heights. When the calibration of coefficients for the height dubbing process is suppressed, heights are dubbed using region-wide default coefficients. Calibration of coefficients for a species is automatically suppressed if less than three non-top-damaged trees of that species are available for the calculations.

field 1: Species code for which calibration of the coefficients for the height-diameter relationship will be suppressed. *Default = All*

field 2: Suppression flag. *Defaults: BM, EC, KT, NC, PN, SO, WC = 0, others = 1*

0	Suppress calibration of coefficients (i.e. use defaults).
1 or greater	No suppression of calibration of coefficients.

NOTREES

(NO TREE recordS)
Variants: All
Related keywords: ESTAB

Specifies that no projectable tree records will be used as input, which permits "bare ground" simulations. The Regeneration Establishment Model can then be used to generate a list of seedlings to be projected. If the NOTREES keyword is not used, at least two live-tree records must be present in the input tree data.

Reference: GTR INT-208, Supplement to the User's Guide..., p. 19

NOTRIPLE

(NO tree record TRIPLE)
Variants: All
Related keywords: NUMTRIP, DGSTDEV

Suppresses record tripling. When a stand is represented by relatively few records (less than approximately 100) tripling is a mechanism to increase the number of replications to help stabilize the random effects (see DGSTDEV). Each tree record is split into three records such that the three records together represent the same number of trees per acre as the original record. The new records are similar except for diameter growth, and the weighted average of the new records is equal to the original record. Unless otherwise specified, records are tripled twice), once in the first cycle and once in the second cycle. If the total number of records would exceed 1350 tripling is not done.

No fields are associated with this keyword.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 92

NUMCYCLE

(NUMber of CYCLEs)
Variants: All
Related keywords: TIMEINT, INVYEAR

Specifies the number of cycles to run the projection. A cycle is the period of time for which tree characteristics are predicted, and for which inventories are reported (see TIMEINT). The maximum number of cycles in a projection is 40.

field 1: Number of cycles to be projected.

Note: The Suppose interface program automatically includes a NUMCYCLE keyword (with a default of ten cycles). This may be overridden by using the "Set Time Scale" option, or by including an additional NUMCYCLE keyword. Use of a NUMCYCLE keyword will override the entries from the "Set Time Scale" option.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 8

NUMTRIP

(NUMber of times TRIPled)
Variants: All
Related keywords: NOTRIPLE, DGSTDEV

Specifies the number of times tree records will be tripled. Tripling will be attempted once in the first cycle and once in each subsequent cycle for the number of times specified. If the total number of records would exceed 1350 tripling is not done. When a stand is represented by relatively few records (less than approximately 100) tripling is a mechanism to increase the number of replications to help stabilize the random effects (see DGSTDEV). Each tree record is split into three records such that the three records together represent the same number of trees per acre as the original record. The new records are similar except for diameter growth, and the weighted average of the new records is equal to the original record. Unless otherwise specified, records are tripled twice), once in the first cycle and once in the second cycle.

field 1: Number of times tripling will be attempted. *Default = 2*

Note: In a bare ground projection, the number of times that records will be tripled is one less than the number specified because tripling occurs before the addition of regeneration records to the treelist. For example, if you want the tree records to be tripled twice in a bare ground projection, set the value in field 1 to 3.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 92

OPEN

(OPEN a file)
Variants: All
Related keywords: ADDFILE, CLOSE

Requests that an external file be opened for input (e.g. an addfile) or output (e.g. a treelist file). A supplemental record is required to specify a filename for the unit that is to be opened.

field 1: File reference number for the input or output file. File reference numbers are a mechanism that FVS uses to keep track of external files. Numbers less than 30 are reserved for files that are currently used by FVS.

field 2: Code for specifying the meaning of blanks in numeric fields. *Default = 0*

0	Treat blanks as zeros
non-zero	Treat blanks as null characters

field 3: File status code. *Default = 0*

0	Unknown (file may or may not currently exist)
1	New (file does not currently exist)
2	Old (file currently exists)

field 4: Maximum record length in the file (number of characters per line). *Default=150*

field 5: File format switch. Choose unformatted only when the sole purpose of creating this file is for use as input to another program that requires unformatted input.

1	Formatted
2	Unformatted

Supplemental record:

Specify a filename for the input or output file that is to be opened. The maximum permitted length of the filename is 40 characters, and there can be no leading blanks.

Note: There is no default value for the file reference number (field 1). If this field is left blank the OPEN request is ignored.

PROCESS

(PROCESS the keywords)
Variants: All

Signifies the end of a set of keywords that define a single projection and triggers the beginning of the simulation. The PROCESS keyword must be present or the projection will not run. Multiple PROCESS keywords (i.e. multiple projections) are possible within a single simulation file.

No fields are associated with this keyword.

Note: The Suppose interface program automatically includes a PROCESS keyword. If multiple stands are selected, multiple PROCESS keywords will be included and multiple projections will result.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 8

PRUNE

(PRUNE trees)
Variants: All
Related keywords: CRNMULT

Schedules pruning of a specified component of the stand. Removes portions of a trees crown ratio as part of a stand treatment scenario.

field 1: Year or cycle pruning is to be done. *Default = 1*

field 2: Method of pruning. *Default = 2*

- 1 Prune to a specified height to base of live crown (field 3) without regard to the proportion of live crown this would remove
- 2 Prune to a specified height to base of live crown (field 3). If this would result in removing more than a specified proportion (field 4) of the live crown ratio, only remove enough crown to reach the specified proportion, instead of the specified height.
- 3 Prune to a specified height to base of live crown (field 3). If this would result in removing more than a specified proportion (field 4) of the live crown ratio, do not prune the tree.
- 4 Remove a specified proportion (field 4) of the live crown.
- 5 Remove a specified length (field 3) of the live crown without regard to the proportion of live crown this would remove.
- 6 Remove a specified length (field 3) of the live crown. If this would result in removing more than a specified proportion (field 4) of the live crown ratio, only remove enough to reach the specified proportion, rather than removing the specified length.
- 7 Remove a specified length (field 3) of the live crown. If this would result in removing more than a specified proportion (field 4) of the live crown ratio, do not prune the tree.

field 3: Height in feet. *Default = 0*
If field 2 = 1, 2, or 3, this is the height to the base of live crown.
If field 2 = 5, 6, or 7, this is the length of crown to be removed.

field 4: Maximum proportion. *Range: 0.0 - 1.0, Default = 0.5*
If field 2 = 2 or 6, this is the maximum proportion of live crown that can be removed.
If field 2 = 3 or 7, this is the threshold that determines whether the tree will be pruned or not.
If field 2 = 4, this is the proportion of live crown to be removed.

field 5: Species code to be pruned. *Default = All*

field 6: Minimum dbh in inches (greater than or equal to) that will be considered for pruning. *Default = 0.0*

field 7: Maximum dbh in inches (less than) that will be considered for pruning. *Default = 99.0*

Note: All prunings are considered in the same context as thinnings, and are done at the beginning of the cycle in which they are scheduled.

Note: All thinnings scheduled within a cycle are done before any pruning requests are processed. (i.e. the only trees that will be pruned are those left after the thinning)

Note: If no trees remain after thinning, all pruning requests will be cancelled.

Note: If the combination of parameters on a pruning keyword results in no trees being pruned, the pruning request is cancelled.

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

Caution: If this keyword is embedded in an event monitor sequence, field 1 is interpreted as years from the time the event is true until implementation, or in other words, a lag time. (e.g. a 5 in field 1 means wait 5 years after event is true to prune the stand.)

RANNSEED (RANdom Number SEED)

Variants: All

Reseeds the pseudorandom number generators used in the FVS model. If a 0 (zero) is used as the replacement value for the seed, the model will run stochastically (i.e. results will vary for multiple runs of the same simulation file). With any non-zero seed value the model will run deterministically (i.e. the results will be the same for multiple runs of the same simulation file).

field 1: Replacement value for the pseudorandom number seed (should be an odd integer). *Default = 55329*

Note: The FVS base model and the Regeneration Establishment extension use separate pseudorandom number generators. Each one can be reseeded independently. Using a RANNSEED keyword inside an ESTAB-END sequence affects the Regeneration Establishment extension.

References: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 94
GTR INT-208, Supplement to the User's Guide..., p. 14
GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 32

Refer to GTR INT-394, Implications of Random Variation in the Stand Prognosis Model, for a discussion of the stochastic nature of the model.

READCORD (READjust CORrection for Diameter)

Variants: All
Related keywords: READCORH, READCORR, BAIMULT, NOCALIB

Readjusts the baseline estimate for the large-tree diameter growth model. For any particular species, the original baseline estimate is multiplied by the value from this keyword, and the result becomes the new baseline estimate. These adjustments are done prior to model calibration. Calculated scale factors will still attenuate toward a value midway between the calculated scale factor and the new baseline estimate.

No fields are associated with this keyword. Multipliers are entered on two or more supplemental records

Supplemental records:

Each supplemental record consists of eight 10-character fields, each of which contains a multiplier value for a species. Decimal points should be explicitly typed. The fields are in order of the species sequence number in the variant (see Appendix A). Multiple supplemental records are required. *The default value for all species in all variants is 1.0*. A blank or 0 (zero) is interpreted as a 1.0.

Example for a variant with 11 species:

```
READCORD
      1.2      1.0     1.05      0.8     0.85      1.0     1.25     1.0
      1.0     0.85      1.0
```

Note: If a significant number of previous FVS runs have shown that there is a consistent bias in the scale factors for any species, the average scale factor for that species can be entered using this keyword.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 90

READCORH (READjust CORrection for Height)

Variants: All
Related keywords: READCORD, READCORR, HTGMULT, NOCALIB

Readjusts the baseline estimate for the large-tree height growth model. For any particular species, the original baseline estimate is multiplied by the value from this keyword, and the result becomes the new baseline estimate. These adjustments are done prior to model calibration.

No fields are associated with this keyword. Multipliers are entered on two or more supplemental records

Supplemental records:

Each supplemental record consists of eight 10-character fields, each of which contains a multiplier value for a species. Decimal points should be explicitly typed. The fields are in order of the species sequence number in the variant (see Appendix A). Multiple supplemental records are required. *The default value for all species in all variants is 1.0*. A blank or 0 (zero) is interpreted as a 1.0.

Example for a variant with 11 species:

```
READCORH
      1.3      1.0     1.15      0.7     0.75      1.0     1.25     1.0
      1.0     0.95      1.0
```

Note: If a significant number of previous FVS runs have shown that there is a consistent bias in the large tree height growth for any species, an average multiplier value for that species

can be entered using this keyword.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 90

READCORR (READjust CORrection for Regeneration)

Variants: All
Related keywords: READCORH, READCORD, NOCALIB

Readjusts the baseline estimate for the small-tree height growth model. For any particular species, the original baseline estimate is multiplied by the value from this keyword, and the result becomes the new baseline estimate. These adjustments are done prior to model calibration. Calculated scale factors will still attenuate toward a value midway between the calculated scale factor and the new baseline estimate.

No fields are associated with this keyword. Multipliers are entered on two or more supplemental records

Supplemental records:

Each supplemental record consists of eight 10-character fields, each of which contains a multiplier value for a species. Decimal points should be explicitly typed. The fields are in order of the species sequence number in the variant (see Appendix A). Multiple supplemental records are required. A blank or 0 (zero) is interpreted as a 1.0. *The default value for all species in all variants is 1.0*.

Example for a variant with 11 species:

```
READCORR
       1.1      1.0     1.25     0.85      0.8      1.0     1.05      1.0
       1.0     0.65      1.0
```

Note: If a significant number of previous FVS runs have shown that there is a consistent bias in the scale factors for any species, the average scale factor for that species can be entered using this keyword.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 90

REGDMULT (REGeneration Diameter growth MULTiplier)

Variants: All
Related keywords: REGHMULT, BAIMULT

Specifies a growth multiplier for the small-tree diameter growth model.

field 1: Year or cycle in which multiplier is applied. Once in effect, it remains in effect until replaced by a subsequent multiplier. *Default = 1*

field 2: Species code to which multiplier is applied. *Default = All*

field 3: Multiplier value (e.g. a value of 1.2 will increase the predicted small tree diameter growth by 20%). *Default = 1.0*

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 94

REGHMULT (REGeneration Height growth MULTiplier)

Variants: All
Related keywords: REGDMULT, HTGMULT, READCORR

Specifies a growth multiplier for the small-tree height growth model.

field 1: Year or cycle in which multiplier is applied. Once in effect, it remains in effect until replaced by a subsequent multiplier. *Default = 1*

field 2: Species code to which multiplier is applied. *Default = All*

field 3: Multiplier value (e.g. a value of 1.2 will increase the predicted small tree height growth by 20%). *Default = 1.0*

Note: Changing the small-tree height increment also changes the small-tree diameter growth increment, and may have other cascading effects throughout the model.

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 94

RESETAGE (RESET stand AGE)

Variants: All

Sets the stand age to zero to make FVS model output correspond to the actual age of the stand. Age is strictly for reporting purposes and has no effect on growth or survival prediction. Its only effect is on the calculation of mean annual increment. This keyword is useful when average stand age has changed due to thinnings and plantings.

field 1: Year or cycle that stand age is to be changed (usually the year of disturbance).

field 2: New stand age. *Default = 0*

SCREEN (output to SCREEN)

Variants: All

Requests printing of an abbreviated copy of the summary statistics table to the terminal screen or a file during program execution.

field 1: File reference number where the Screen output to be directed. The default is to direct output to unit 6, which is the terminal screen. If the value is any number other than 6 or blank, then an associated SCREEN output file needs to be opened with OPEN keyword. *Default = 6 (screen)*

Note: The Suppose interface program automatically includes a SCREEN keyword that sends the output to the terminal screen.

Example sending output to new unit:

```
SCREEN              50
OPEN                50
SCREEN.OUT
```

SDIMAX

(Stand Density Index MAXimum)
Variants: AK, BM, CA, CR, EC, EM, KT, NC, NI, PN, SE, SN, SN, SO, TT, UT, WC, WS
Related keywords: BAMAX, MORTMULT

Specifies the maximum stand density index by species. The value of the maximum stand density index is an important variable in determining stand mortality and normal stocking for automatic thinnings. Also, in some variants, maximum SDI is used to model crown ratio change for individual tree records.

Maximum SDI for a stand is computed as a weighted average of the SDI maximums for each species in the stand. The weight for a species is calculated as the total basal area for that species divided by the total basal area in the stand. Maximum stand SDI is used in all variants to determine normal stocking for automatic thinnings. In addition, it is used to calculate density related mortality in all variants except CI, CS, LS, NE, and NI.

field 1: Species code for which the maximum stand density index applies. *Default = All*
field 2: Maximum stand density index value. *Defaults are based on the predominant species in the stand or are a function of plant community (see defaults below).*
field 3: *No longer used.*
field 4: *No longer used.*
field 5: Percentage of theoretical maximum density at which density-related mortality is invoked. *Default = 55, Lower limit = 10*
field 6: Percentage of theoretical maximum density at which the stand reaches actual maximum density. *Default = 85, Upper limit = 95*
field 7: Stagnation indicator (CR variant only). *Default = 0*

0	No stagnation effect
1	Include stagnation effect when stand SDI is above 70% of maximum SDI

SDI is computed using the following equation:

$$SDI = N(D/10)^{1.605}$$

where: SDI = stand density index
N = number of trees per acre in the stand
D = quadratic mean diameter in the stand

Caution: Use of this keyword can drastically change predicted yields.

Caution: If multiple SDIMAX keywords are used, fields 5, 6, and 7 should only be specified once.

Note: This keyword is processed before any tree data is read. If after reading the tree data it is found that the stand is above the upper limit of maximum density, the maximum SDI will be automatically recalculated without regard to the value set with this keyword.

Note: In all variants other than NI, KT, and CI, if both SDIMAX and BAMAX are specified, the SDIMAX values will override the BAMAX values.

Maximum SDI Defaults by Species:

AK - Southeast Alaska (SEAPROG)

WS	RC	SF	MH	WH	YC	LP	SS	AF	HD	OT
750	750	750	750	750	750	750	750	750	750	750

BM - Blue Mountains

WP	WL	DF	GF	MH	LP	ES	AF	PP	OT
824	858	792	858	858	841	824	858	776	858

Modified by the ratio of GBA for the specified plant community to the GBA of the most productive plant community in the geographic area.

CA - Inland California, Southern Cascades (ICASCA)

Region 5

PC	IC	RC	WF	RF	SF	DF	WH	MH	WB	KP
570	570	570	760	800	800	600	580	580	460	430

LP	CP	LM	JP	SP	WP	PP	MP	GP	JU	BS
580	430	460	430	430	460	430	430	430	330	580

GS	PY	OS	LO	CY	DO	EO	WO	BO	VO	IO
570	570	430	550	550	550	550	550	550	550	550

BM	BU	RA	MA	GC	DG	OA	WA	TO	SY	AS
550	550	550	550	550	550	550	550	550	550	550

CO	WI	CN	BL	OH
550	550	550	550	550

Region 6

Based on plant association type.

CI - Central Idaho

555 for all species

CR - Central Rockies

AF	CB	DF	GF	WF	MH	RC	WL	BC	LM	LP	PI
735	735	560	735	735	735	770	650	470	470	675	415

PP	WB	WP	JU	BS	ES	WS	AS	CO	OA	OS	OH
529	470	645	415	735	735	735	725	470	470	470	470

EC - Eastside Cascades

Based on plant association

EM - Eastern Montana

467-775 based on habitat type. All species are set to the same default value.

KT - Kootenai, Kaniksu, Tally Lake (KOOKANTL)

555 for all species

NC - Northern California (Klamath Mountains)

OC	SP	DF	WF	M	IC	BO	TO	RF	PP	OH
624	647	547	759	588	706	382	759	800	571	759

NI - North Idaho (Inland Empire)

555 for all species

PN - Pacific Northwest Coast

Based on plant association

SN - Southern

Based on forest type

SO - South-Central Oregon, Northeast California (SORNEC)

	WP	SP	DF	WF	MH	IC	LP	ES	RF	PP	OT
Reg 5	624	647	547	759	624	706	406	671	800	571	353
Reg 6	447	447	447	659	758	447	541	659	659	429	616

TT - Tetons

WB	LM	DF	WF	AS	LP	ES	AF	PP	OT
400	400	440	560	450	540	625	625	400	400

UT -Utah

WB	LM	DF	WF	AS	LP	ES	AF	PP	OT
400	400	440	560	450	540	625	625	400	400

WC - Westside Cascades

Based on plant association

WS - Westside Sierra Nevada (WESSIN)

OC	SP	DF	WF	GS	IC	BO	JP	RF	PP	TO
624	647	547	759	588	706	382	571	800	571	759

SERLCORR (SERiaL CORRelation)

Variants: All

Replaces parameters for the serial correlation function of the autoregressive moving-average model, ARMA(1,1), which produces serial correlation between errors for successive diameter increment predictions. To some degree, diameter growths in one cycle can be made to correlate with diameter growths from the previous cycle. That is to say a tree growing well in one cycle will tend to keep growing well, relative to other trees, in the next cycle. The primary use of this keyword is to turn off the autocorrelation by setting both parameters to 0 (zero). Use of other values is strongly discouraged unless the user understands well the implications on the model.

field 1: Autoregressive operator ö for the ARMA(1,1) model. *Default = 0.74*

field 2: Moving-average operator è for the ARMA(1,1) model. *Default = 0.42*

Note: Setting the value of both fields to 0 (zero) turns off the autocorrelation.

Caution: Many of the predictions in FVS are based on diameter increment. Changing the diameter increment prediction also changes many of the other predictions made in the model.

SITECODE (SITE index CODE)

Variants: All except CI, KT, and NI

Sets species-specific site index values. If a SITECODE keyword is present, all species for which site index values were not explicitly set will be assigned site index values derived from the site index of the specified site species. If no SITECODE keyword is present, site index defaults are assigned as shown in Appendix B.

field 1: Species code. If blank, all species will be assigned the value in field 2. *Default = blank (all species)*

field 2: Site index in feet. For the NC, SO, and WS variants, a value less than 10 is interpreted as a Dunning site code and is converted to a site index for each species as described in the technical documentation for those variants. *Defaults shown in Appendix B*

field 3: Site species override code. A non-zero value designates the species in field 1 as the site species for the stand. *Default = 0*

Note: If field 3 is 0 (zero) or blank in each of the SITECODE keywords used, the species from the first SITECODE keyword with a non-zero, non-blank species code becomes the site species for the stand.

Note: The Suppose interface program automatically includes a SITECODE keyword based on the site index and site species fields of the stand list file if those fields are not blank.

SPCODES

(SPecies CODES)
Variants: All
Related keywords: TREEFMT

Identifies species codes used on the input tree records. This keyword is used when the species codes in the input tree records do not match the standard FVS species codes for the variant being used (see Appendix A). One or more supplemental records are required that contain the species codes from the input tree records.

field 1: FVS species sequence number (integer) whose alpha code is to be overridden. Do not enter the 2-character alpha species code. If blank, all species codes are to be replaced.

Supplemental record(s):

Species codes from the input tree records are left justified in 4-character fields. If field 1 identifies a specific species, the supplemental record consists simply of one 4-character field. If field 1 is blank, then all species codes are to be overridden and each supplemental record consists of up to twenty consecutive 4-character fields. In this case, the species codes are entered sequentially in the order of the species sequence numbers (see Appendix A). Each species in FVS can be represented by only *one* code from the input tree records.

Example 1, single species:

```
SPCODES             7
LPP
```

Example 2, all species in a variant with 24 species:

```
SPCODES
SAF CF3 DF  217 WF2 MTH  68 WL5 BC  LP5 LPP PY  PP1 WBP WWP J   BS2 93  WTS ASP
CW  A99 990 999
```

Note: The codes in the supplemental records are interpreted literally and blanks are not equivalent to zeros. For example, "WP " is different than " WP" (trailing spaces vs. leading spaces). Also " 3" is different than " 03".

Note: If all tree records are ultimately reported by FVS as "other species" or something similar, an error has probably been made in the preparation of either the SPCODES or TREEFMT keywords.

SPECPREF

(SPECies removal PREFerence)
Variants: All
Related keywords: TCONDMLT, THINxxx

Sets the removal preference for a species. This affects the order in which trees are selected for removal when a harvest is implemented. When a thinning is implemented, tree records with the highest removal priority are selected first, and selection continues based on removal priority until the parameters of the thinning have been met, or until all records have been selected. The removal priority is determined by the equation below:

$$\text{Removal Priority} = (\text{DBH} * F_D) + \text{SP} + (\text{TVC} * F_T) + (\text{MR} * F_M) + (\text{STS} * F_S)$$

All terms after the first default to zero. (See TCONDMLT and refer to the Dwarf Mistletoe Impact Model keyword documentation for MISTPREF for a discussion of the other terms). The relevant part of the equation for this keyword is:

$$\text{Removal Priority} = (\text{DBH} * F_D) + \text{SP}$$

where: DBH = diameter at breast height
F_D = 1 for thinning from above, -1 for thinning from below
SP = species preference

For the species designated in field 2 of the SPECPREF keyword, the SP (species preference) term has the value assigned in field 3. Species preference for other species are set with additional SPECPREF keywords, otherwise they have a default value of 0 (zero). The SPECPREF keyword alone does not remove trees. It must be followed by one or more thinning keywords, which, in conjunction with the SPECPREF keyword, determine the order of tree records selected.

field 1: Year or cycle the preference is to be applied. Once in effect it remains in effect until replaced by a subsequent multiplier. *Default = 1*

field 2: Species code whose removal priority is to be changed. A valid code is required or the keyword is ignored.

field 3: Preference value for removal of species identified in field 2. A positive value increases the chance for tree removal and a negative value increases the chance for tree retention. *Default = 0*

Example: In a thinning from above, a 15-inch PP is selected for harvest before a 12-inch WF. If a SPECPREF keyword is used to assign a preference of 5 to WF, then the WF (whose removal priority is now 12*1 + 5, or 17) is selected before the PP, even though the PP is larger.

Note: For any particular species this keyword remains in effect until a subsequent use of the keyword changes the priority for that species.

Note: Keyword order may be important. If a SPECPREF keyword is specified for the *same year* that a thinning keyword is specified, the species preference will affect the thinning only if the SPECPREF keyword appears in the keyword sequence before the thinning keyword.

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

Caution: The SPECPREF keyword has no effect on thinning done with the THINDBH or THINHT keywords.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 26

STATS

(STATisticS)
Variants: All

Requests that optional output tables that show a statistical description of the input (inventory) data for a projection be written to the standard FVS output file. Statistics reported include board-foot volume, cubic-foot volume, trees per acre, and basal area per acre for each species present in the stand. Also included are the mean, standard deviation, coefficient of variation, and confidence limits across sample plots for stand totals of these volume and density measures. The user-defined significance level defines the corresponding Student's t-value computed by the program.

field 1: Significance level for computing confidence limits. *Default = 0.05*

Caution: No corrections are made to account for non-stockability if the stand contains non-stockable plots. These plots are included in the calculations.

STDIDENT

(STanD IDENTification)
Variants: All

Specifies a stand identification code and optional descriptive title to label output tables.

No fields are associated with this keyword. Stand identification information is entered on a supplemental record.

Supplemental record:

Contains a stand identification code of up to 26 characters. This stand ID will appear with every output table. A blank character indicates the end of the stand identification code. Anything entered after the blank, up to column 80, is read as an optional "Title" that will appear with some of the output tables.

Example:

```
STDIDENT
C24S112  Stand 112 in Clear Creek drainage
```

This example uses "C24S112" as the stand ID. This appears along with "Stand 112 in Clear Creek drainage" in the headings of tables in the main FVS output file.

Note: The Suppose interface program automatically includes a STDIDENT keyword based on the Stand ID field in the stand list file and the Location Name field in the locations file.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 11

STDINFO

(STanD INFOrmation)
Variants: All
Related keywords: MODTYPE

Describes the characteristics of the site where the stand is located. Default values for the different fields vary by variant and are listed in the table below the field descriptions.

field 1: Numeric Region and National Forest code where stand is located.
RFF where R = region, FF = 2-digit forest code

For KT variant, RFFDDCCC where R = region, FF = forest, DD = district, CCC = compartment (used in growth equations)

For SE and SN variants, RFFDD where R = region, FF = forest, DD = district (used in volumes)

field 2: Stand habitat type code or plant community code (ecological unit code in SN.)

field 3: Stand age.

field 4: Stand aspect in degrees (0 = level, 360 = north).

field 5: Stand slope percent.

field 6: Stand elevation in 100's of feet (10's of feet is AK variant). For example, a code of 52 would mean elevation is 5200 feet (520 feet in AK).

field 7: Stand Latitude in degrees.

Field defaults by variant:

	field						
Variant	1	2	3	4	5	6	7
AK	1005	N/A	0	0	5	10	56
BM	616	CWG113	0	0	5	45	39
CA	610	XCWC221	0	0	5	35	45
CI	412	260	0	0	5	50	45
CR[a]							
SM	303	0	0	0	5	88	35
SP	303	0	0	0	5	88	35
BH	203	0	0	0	5	55	44
SF	211	0	0	0	5	90	40
LP	211	0	0	0	5	90	40
CS	905	N/A	0	0	5	12	30
EC	606	CPS241	0	0	5	45	45
EM	108	260	0	0	5	55	45
KT	114	571	0	45	30	35	48
LS	907	N/A	0	0	5	17	47
NC	505	N/A	0	0	5	45	45
NE	922	N/A	0	0	5	30	40
NI	118	260	0	0	5	38	45
PN	612	N/A	0	0	5	7	45
SE	803	N/A	0	0	0	0	36
SN	80106	231Dd	0	0	0	0	36
SO	601	N/A	0	0	5	45	45
TT	415	N/A	0	0	5	65	45
UT	408	N/A	0	0	5	83	45
WC	618	N/A	0	0	5	35	46
WS	517	999	0	0	5	45	39

[a]The Central Rockies (CR) variant has different defaults for the different sub-models as listed on subsequent lines (SM is southwest mixed conifer, SP is southwest ponderosa pine, BH is Black Hills, SF is spruce-fir, and LP is lodgepole pine).

Note: Any field on the STDINFO keyword that is left blank will retain the value assigned by a previous STDINFO keyword. If no value was previously assigned, the default is used.

Note: The Suppose interface program automatically includes a STDINFO keyword based on the corresponding fields in the stand list file.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 12

STOP

(STOP processing)
Variants: All

Marks the end of the keyword record file. When the STOP keyword is encountered, program execution ends.

No fields are associated with this keyword.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 8

STRCLASS

(STRuctural CLASS)
Variants: All

Requests that structural class calculations are done by FVS. A table of structural statistics can be written to the main FVS output file. The structural class computation results are made available to the Event Monitor. The STRCLASS keyword must be present if the user is going to use Event Monitor structural stage variables (refer to the list in the Note that follows this description).

field 1: A nonzero entry causes FVS to print the table of structural statistics in the main FVS output file. 0 (zero) suppresses printing of the tables. *Default = 1*

field 2: The percentage of a tree's height that is used to define the minimum gap size. *Range: 0-100, Default = 30*

field 3: The dbh boundary (in inches) separating seedling/sapling-sized trees from pole sized trees. *Default = 5.0*

field 4: The dbh boundary (in inches) separating pole-sized trees from large trees that may be considered old. *Default = 25.0*

field 5: The minimum percent cover that must be exceeded for a potential stratum to qualify as an actual stratum. *Range: 0-100, Default = 5*

field 6: Minimum trees per acre that must be exceeded for a stand that has less than 5 percent cover to be classified stand initiation rather than bare ground. *Default = 200*

field 7: Percentage of the maximum stand density index that must be exceeded for a stand to be classified stem exclusion rather than stand initiation. *Range: 0-100, Default = 30*

NOTE: When the STRCLASS keyword is used, thereby triggering the classification logic, the following Event Monitor variables are automatically defined by FVS:

BSCLASS Before-thinning structural class code

ASCLASS	After-thinning structural class code
BSTRDBH	Before-thinning weighted average dbh of the uppermost stratum
ASTRDBH	After-thinning weighted average dbh of the uppermost stratum
BCANCOV	Before-thinning percent canopy cover for the stand
ACANCOV	After-thinning percent canopy cover for the stand

Reference: RMRS-GTR-24, Percent Canopy Cover and Stand Structure Statistics ...

SVS

(Stand Visualization System input)
Variants: All

Generates an output file specifically for running the Stand Visualization System (SVS) post processor. The SVS software is not a part of the FVS software. It is maintained by the Pacific Northwest Research Station. It generates 3D drawings of the stand based on information produced by FVS.

field 1: Plot geometry and tree placement. *Default = 1*

0	Square SVS layout, ignore FVS plot designations
1	Square SVS layout, position trees by FVS plot designation
2	Round SVS layout, ignore FVS plot designations
3	Round SVS layout, position trees by FVS plot designation

field 2: Output file organization. *Default = 0*

0	Images in separate files, an index file is created
1	Images all in one file, no index file is created

field 3: Draw range poles. *Default = 0*

0	Range poles are drawn at the edges of the SVS layout
1	No range poles

field 4: Draw subplot boundaries. *Default = 0*

0	FVS plot boundaries are drawn as lines in the SVS layout
1	No FVS plot boundaries drawn

Note: Use of this keyword does not automatically start the SVS post processor program.

Note: The output files created by the SVS keyword vary based on the value in field 2 of this keyword. If an index file is produced, it has the same base name as the simulation file with a *_index.svs* appended. The image files associated with the index file are placed in a directory with the base name of the simulation file. The first image file is named with the simulation base name with *_001.svs* appended, and subsequent files are named similarly using subsequent numbers in the names. (e.g. simulation file *testrun.key* produces index file *testrun_index.svs*, and image files *testrun_001.svs*, *testrun_002.svs*, etc.) If all images are in a single file, that file is named with the simulation base name with *.svs* as the extension (e.g. simulation file *testrun2.key* produces image file *testrun2.svs*).

TCONDMLT

(Tree Condition MULTiplier)
Variants: All
Related keywords: SPECPREF, THINxxx

Sets the tree value class multiplier and/or the special tree status multiplier in the harvest priority algorithm. This affects the order in which trees are selected for removal when a harvest is implemented. When a thinning is implemented, tree records with the highest removal priority are

selected first, and selection continues based on removal priority until the parameters of the thinning have been met, or until all records have been selected. The removal priority is determined by the equation below:

$$\text{Removal Priority} = (\text{DBH} * F_D) + \text{SP} + (\text{TVC} * F_T) + (\text{MR} * F_M) + (\text{STS} * F_S)$$

All terms after the first default to zero. (See SPECPREF and refer to the Dwarf Mistletoe Impact Model keyword documentation for MISTPREF for a discussion of the other terms). The relevant part of the equation for this keyword is:

$$\text{Removal Priority} = (\text{DBH} * F_D) + (\text{TVC} * F_T) + (\text{STS} * F_S)$$

where: DBH = diameter at breast height
F_D = 1 for thinning from above, -1 for thinning from below
TVC = tree value class (column 48 of the standard input tree record;
1 = desirable, 2 = acceptable, 3 = undesirable)
F_T = tree value class multiplier (field 2 value).
STS = special tree status (the severity code associated with a damage code of 55 in the input tree record)
F_S = special tree status multiplier (field 3 value)

The tree value class multiplier F_T is applied to the value class of all tree records. A value of 0 (zero) causes value class to be ignored in determining removal priority. The special tree status multiplier F_S is applied to the special tree status of any records that were given a special tree status (a special tree status code is the severity code associated with a damage code of 55). Special tree status codes are arbitrary. They were incorporated as a mechanism to allow modification of the removal priority based on user-defined attributes that would be otherwise unavailable to the user. A value of 0 (zero) causes special tree status to be ignored in determining removal priority. The TCONDMLT keyword alone does not remove trees. It must be followed by one or more thinning keywords, which, in conjunction with the TCONDMLT keyword, determine the order of tree records selected.

field 1: Year or cycle in which the change is to be implemented. Once in effect it remains in effect until replaced by a subsequent multiplier. *Default = 1*

field 2: Tree value class multiplier. A positive value increases the chance for removal of lower value class trees. A negative value increases the chance for removal of higher value class trees. *Default = 0*

field 3: Special tree status multiplier. A positive value increases the chance of removal of trees with a high special tree status code. A negative value increases the chance of retention of trees with a high special tree status code. *Default = 0*

Note: This keyword remains in effect until a subsequent use of the keyword changes the multipliers.

Note: Keyword order may be important. If a TCONDMLT keyword is specified for the *same year* that a thinning keyword is specified, the multipliers will affect the thinning only if the TCONDMLT keyword appears in the keyword sequence before the thinning keyword.

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

Caution: The TCONDMLT keyword has no effect on thinning done with the THINDBH or THINHT keywords.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 26

THEN

(schedule if-THEN activities)
Variants: All
Related keywords: IF, ENDIF

Signifies the scheduling portion of an Event Monitor IF-THEN block. The Event Monitor keyword sequence must begin with an IF keyword. The next record must be a condition statement that evaluates to true or false. The next record is a THEN keyword. The sequence ends with an ENDIF keyword. All keywords contained between the THEN and ENDIF keywords will be executed whenever the condition is true. Any activity that can be normally scheduled can be alternatively scheduled within the Event Monitor IF-THEN block. The scheduling date (field 1) on the activity is then interpreted as a delay period. If the date entered is 10, the activity will be scheduled 10 years following the each date that the logical expression is true. Multiple activities can be scheduled in a single IF-THEN block, and all will be triggered by the same condition.

Example: If stand basal area exceeds 100 square feet per acre, wait 10 years (first parameter of the THINDBH keyword is now a delay period) and then thin the stand according to the THINDBH parameters. Once this condition is true, wait 30 years (parameter on the IF keyword) before checking the condition again:

```
IF              30
BBA GT 100
THEN
THINDBH         10        0       99      1.0        0        0        0
ENDIF
```

Caution: The year/cycle field on activity keywords changes meaning to become a delay period when the keywords are included in an Event Monitor IF-THEN block. Entering 2010 in the date field of an activity keyword that is in an IF-THEN block will cause a delay period of 2010 years.

Note: When using the Suppose interface program, scheduling by condition is accomplished by clicking the "Schedule by Condition" button in individual keyword windows, and then clicking the "Condition" button and selecting "Free Form" to set up the condition statement. The activity keyword that follows the THEN statement (the THINDBH keyword as shown in the example above) is not typed in explicitly, but is rather set up using the keyword window. When the condition statement has been typed in, the "OK" button is clicked to return to the keyword window to fill in the appropriate field values. The ENDIF keyword will be added automatically.

Reference: GTR INT-275, User's Guide to the Event Monitor..., p. 2

THINABA

(THIN from Above to Basal Area target)
Variants: All
Related keywords: THINxxx, SPECPREF, TCONDMLT, CUTEFF

Schedules a thinning from above to a basal-area-per-acre target. Only trees with dbh's and heights within the user-defined ranges are considered for removal. The tree record with the largest diameter within the specified range is considered for removal first, and the proportion of that tree record specified in field 3 is removed. The tree record with the next largest diameter is considered next, then the next largest and so on until the residual basal area target is met or all records in the specified range have been considered. The residual target basal area is specified only for the user-

defined range of dbh and height, and does *not* represent the total residual unless the range of dbh's and heights includes all trees in the stand.

field 1: Year or cycle that thinning is scheduled. *Default = 1*

field 2: Target basal area in square feet per acre for the segment of the dbh and height distribution defined in fields 4-7. *An entry is required*

field 3: Cutting efficiency parameter specific to this thinning request (refer to the CUTEFF keyword for description). *Range: 0.01-1.0, Default = 1.0*

field 4: Smallest dbh in inches to be considered for removal (greater than or equal). *Default = 0.0*

field 5: Largest dbh in inches to be considered for removal (less than). *Default = 999.0*

field 6: Shortest tree in feet to be considered for removal (greater than or equal). *Default = 0*

field 7: Tallest tree in feet to be considered for removal (less than). *Default = 999*

Caution: The specified residual target is for the user-defined range of dbh and height. The total residual will also include all trees that do not fall within this range.

Caution: If the cutting efficiency is set too low, the model may not be able to attain the residual target specified. The thinning request will be completed, but the residual stand condition will be greater than the specified target.

Caution: If a thinning keyword is embedded in an event monitor sequence, year (field 1) is interpreted as years from the time the condition is true until implementation, or in other words, a lag time. (e.g. a 5 in field 1 means wait 5 years after condition is true to thin the stand.)

Note: If field 2 is blank the keyword is ignored.

Note: If the initial stand condition is already less than the target specified, the thinning will be cancelled. Look at the "Activity Summary" portion of the standard FVS output to see which requests were implemented and which were cancelled.

Note: A thinning is always done in the first year of the cycle in which it is scheduled, even if the year entered in field 1 is not the first year of the cycle. If a thinning must occur in a particular year, a TIMEINT keyword may be needed to change the length of a cycle so that the desired year for the thinning becomes the first year of a cycle.

Note: Multiple thinning keywords can be scheduled for the same year to simulate different aspects of a single harvest. Care must be taken to ensure that the dbh and height ranges do not unintentionally overlap, or the residual may not be what was expected. Total residuals must be calculated carefully.

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

References: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 27
GTR INT-208, Supplement to the User's Guide..., p. 16

THINATA

(THIN from Above to Trees per Acre target)
Variants: All
Related keywords: THINxxx, SPECPREF, TCONDMLT, CUTEFF

Schedules a thinning from above to a trees-per-acre target. Only trees with dbh's and heights within the user-defined ranges are considered for removal. The tree record with the largest diameter within the specified range is considered for removal first, and the proportion of that tree record specified in field 3 is removed. The tree record with the next largest diameter is considered next, then the next largest and so on until the residual trees-per-acre target is met or all records in the specified range have been considered. The residual target trees per acre is specified only for the user-defined range of dbh and height, and does *not* represent the total residual unless the range of dbh's and heights includes all trees in the stand.

field 1: Year or cycle that thinning is scheduled. *Default = 1*

field 2: Target trees per acre for the segment of the dbh and height distribution defined in fields 4-7. *An entry is required*

field 3: Cutting efficiency parameter specific to this thinning request (refer to the CUTEFF keyword for description). *Range: 0.01-1.0, Default = 1.0*

field 4: Smallest dbh in inches to be considered for removal (greater than or equal). *Default = 0.0*

field 5: Largest dbh in inches to be considered for removal (less than). *Default = 999.0*

field 6: Shortest tree in feet to be considered for removal (greater than or equal). *Default = 0*

field 7: Tallest tree in feet to be considered for removal (less than). *Default = 999*

Caution: The specified residual target is for the user-defined range of dbh and height. The total residual will also include all trees that do not fall within this range.

Caution: If the cutting efficiency is set too low, the model may not be able to attain the residual target specified. The thinning request will be completed, but the residual stand condition will be greater than the specified target.

Caution: If a thinning keyword is embedded in an event monitor sequence, year (field 1) is interpreted as years from the time the condition is true until implementation, or in other words, a lag time. (e.g. a 5 in field 1 means wait 5 years after condition is true to thin the stand.)

Note: If field 2 is blank the keyword is ignored.

Note: If the initial stand condition is already less than the target specified, the thinning will be cancelled. Look at the "Activity Summary" portion of the standard FVS output to see which requests were implemented and which were cancelled.

Note: A thinning is always done in the first year of the cycle in which it is scheduled, even if the year entered in field 1 is not the first year of the cycle. If a thinning must occur in a particular year, a TIMEINT keyword may be needed to change the length of a cycle so that the desired year for the thinning becomes the first year of a cycle.

Note: Multiple thinning keywords can be scheduled for the same year to simulate different aspects of a single harvest. Care must be taken to ensure that the dbh and height ranges

do not unintentionally overlap, or the residual may not be what was expected. Total residuals must be calculated carefully.

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

References: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 27
GTR INT-208, Supplement to the User's Guide..., p. 16

THINAUTO

(THIN AUTOmatically)
Variants: All
Related keywords: THINxxx, SPECPREF, TCONDMLT, CUTEFF

Schedules automatic stocking control. Thinning from below is automatically scheduled whenever the stand density exceeds the user-defined upper limit management threshold. The thinning reduces stand density to the user-defined lower limit management threshold. Thresholds are defined as percentages of maximum stand density index.

field 1: Year or cycle that automatic stocking control is to begin. The need for thinning will be evaluated in that cycle, and in all subsequent cycles. *Default = 1*

field 2: Percentage of maximum SDI that defines the lower management limit for stand density. *Default = 45*

field 3: Percentage of maximum SDI that defines the upper management limit for stand density. *Default = 60*

field 4: Cutting efficiency parameter specific to automatic stocking control request (refer to the CUTEFF keyword for description). *Range: 0.01-1.0, Default = 1*

Caution: Check the stocking guide used by the growth model to be sure lower and upper limits are appropriate for your area.

Caution: When using the KT or NI variant, an SDIMAX keyword must be included in the simulation file and the SDI maximums must be set for all species, otherwise this keyword will result in a clearcut.

Caution: If the cutting efficiency is set too low, the model may not be able to attain the lower limit specified. The thinning request will be completed, but the residual stand condition will be denser than the lower limit specifies.

Note: If field 2 is blank the keyword is ignored.

Note: This keyword can create management scenarios that are impractical to implement on the ground. Using the Event Monitor, other sets of keywords can be created that achieve automatic stand density control using other thinning keywords. In this way the deficiencies of this keyword can be overcome.

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 28

THINBBA

(THIN from Below to Basal Area target)
Variants: All
Related keywords: THINxxx, SPECPREF, TCONDMLT, CUTEFF

Schedules a thinning from below to a basal-area-per-acre target. Only trees with dbh's and heights within the user-defined ranges are considered for removal. The tree record with the smallest diameter within the specified range is considered for removal first, and the proportion of that tree record specified in field 3 is removed. The tree record with the next smallest diameter is considered next, then the next smallest and so on until the residual basal area target is met or all records in the specified range have been considered. The residual target basal area is specified only for the user-defined range of dbh and height, and does *not* represent the total residual unless the range of dbh's and heights includes all trees in the stand.

field 1: Year or cycle that thinning is scheduled. *Default = 1*

field 2: Target basal area in square feet per acre for the segment of the dbh and height distribution defined in fields 4-7. *An entry is required*

field 3: Cutting efficiency parameter specific to this thinning request (refer to the CUTEFF keyword for description). *Range: 0.01-1.0, Default = 1.0*

field 4: Smallest dbh in inches to be considered for removal (greater than or equal). *Default = 0.0*

field 5: Largest dbh in inches to be considered for removal (less than). *Default = 999.0*

field 6: Shortest tree in feet to be considered for removal (greater than or equal). *Default = 0*

field 7: Tallest tree in feet to be considered for removal (less than). *Default = 999*

Caution: The specified residual target is for the user-defined range of dbh and height. The total residual will also include all trees that do not fall within this range.

Caution: If the cutting efficiency is set too low, the model may not be able to attain the residual target specified. The thinning request will be completed, but the residual stand condition will be greater than the specified target.

Caution: If a thinning keyword is embedded in an event monitor sequence, year (field 1) is interpreted as years from the time the condition is true until implementation, or in other words, a lag time. (e.g. a 5 in field 1 means wait 5 years after condition is true to thin the stand.)

Note: If field 2 is blank the keyword is ignored.

Note: If the initial stand condition is already less than the target specified, the thinning will be cancelled. Look at the "Activity Summary" portion of the standard FVS output to see which requests were implemented and which were cancelled.

Note: A thinning is always done in the first year of the cycle in which it is scheduled, even if the year entered in field 1 is not the first year of the cycle. If a thinning must occur in a particular year, a TIMEINT keyword may be needed to change the length of a cycle so that the desired year for the thinning becomes the first year of a cycle.

Note: Multiple thinning keywords can be scheduled for the same year to simulate different aspects of a single harvest. Care must be taken to ensure that the dbh and height ranges

do not unintentionally overlap, or the residual may not be what was expected. Total residuals must be calculated carefully.

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

References: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 27
GTR INT-208, Supplement to the User's Guide..., p. 16

THINBTA

(THIN from Below to Trees per Acre target)
Variants: All
Related keywords: THINxxx, SPECPREF, TCONDMLT, CUTEFF

Schedules a thinning from below to a trees-per-acre target. Only trees with dbh's and heights within the user-defined ranges are considered for removal. The tree record with the smallest diameter within the specified range is considered for removal first, and the proportion of that tree record specified in field 3 is removed. The tree record with the next smallest diameter is considered next, then the next smallest and so on until the residual trees-per-acre target is met or all records in the specified range have been considered. The residual target trees per acre is specified only for the user-defined range of dbh and height, and does *not* represent the total residual unless the range of dbh's and heights includes all trees in the stand.

field 1: Year or cycle that thinning is scheduled. *Default = 1*

field 2: Target trees per acre for the segment of the dbh and height distribution defined in fields 4-7. *An entry is required*

field 3: Cutting efficiency parameter specific to this thinning request (refer to the CUTEFF keyword for description). *Range: 0.01-1.0, Default = 1.0*

field 4: Smallest dbh in inches to be considered for removal (greater than or equal). *Default = 0.0*

field 5: Largest dbh in inches to be considered for removal (less than). *Default = 999.0*

field 6: Shortest tree in feet to be considered for removal (greater than or equal). *Default = 0*

field 7: Tallest tree in feet to be considered for removal (less than). *Default = 999*

Caution: The specified residual target is for the user-defined range of dbh and height. The total residual will also include all trees that do not fall within this range.

Caution: If the cutting efficiency is set too low, the model may not be able to attain the residual target specified. The thinning request will be completed, but the residual stand condition will be greater than the specified target.

Caution: If a thinning keyword is embedded in an event monitor sequence, year (field 1) is interpreted as years from the time the condition is true until implementation, or in other words, a lag time. (e.g. a 5 in field 1 means wait 5 years after condition is true to thin the stand.)

Note: If field 2 is blank the keyword is ignored.

Note: If the initial stand condition is already less than the target specified, the thinning will be cancelled. Look at the "Activity Summary" portion of the standard FVS output to see which requests were implemented and which were cancelled.

Note: A thinning is always done in the first year of the cycle in which it is scheduled, even if the year entered in field 1 is not the first year of the cycle. If a thinning must occur in a particular year, a TIMEINT keyword may be needed to change the length of a cycle so that the desired year for the thinning becomes the first year of a cycle.

Note: Multiple thinning keywords can be scheduled for the same year to simulate different aspects of a single harvest. Care must be taken to ensure that the dbh and height ranges do not unintentionally overlap, or the residual may not be what was expected. Total residuals must be calculated carefully.

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

References: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 27
GTR INT-208, Supplement to the User's Guide..., p. 16

THINDBH

(THIN from a DBH range)
Variants: All
Related keywords: THINxxx, CUTEFF

Schedules a thinning from throughout a specified dbh range for any or all species to a basal area per acre or trees per acre target. If the target trees per acre or target basal area is nonzero, thinning occurs uniformly throughout the specified dbh range until the target is met (cutting efficiency is ignored). In other words, a calculated proportion of each of the eligible tree records is removed such that the target trees per acre or target basal area is exactly met. If both residual targets are 0 (zero), the cutting efficiency determines the proportion of trees represented by each eligible tree record that will be removed (residual targets are ignored). Only trees of the user-specified species that are within the user-defined dbh range are considered for removal. The residual target basal area per acre or trees per acre is specified only for that species and dbh range, and does *not* represent the total residual unless the dbh range includes all trees of all species in the stand.

field 1: Year or cycle that thinning is scheduled. *Default = 1*

field 2: Smallest dbh in inches to be considered for removal (greater than or equal). *Default = 0.0*

field 3: Largest dbh in inches to be considered for removal (less than). *Default = 999.0*

field 4: Cutting efficiency parameter specific to this thinning request (refer to the CUTEFF keyword for description). *Range: 0.01-1.0, Default = 1*

field 5: Species code for trees to be removed in this cut. *Default = All*

field 6: Target trees per acre for the segment of the dbh distribution of the species defined in fields 2, 3, and 5. *Default = 0*

field 7: Target basal area in square feet per acre for the segment of the dbh distribution of the species defined in fields 2, 3, and 5. *Default = 0*

Caution: The specified residual target is for the user-specified species and user-defined range of dbh only. The total residual will also include all trees that do not fall within this range.

Caution: The Removal Priority Algorithm is not invoked with this keyword, therefore SPECPREF TCONDMLT and MISTPREF keywords have no effect on thinnings that use THINDBH.

Caution: If a thinning keyword is embedded in an event monitor sequence, year (field 1) is interpreted as years from the time the condition is true until implementation, or in other words, a lag time. (e.g. a 5 in field 1 means wait 5 years after condition is true to thin the stand.)

Note: If the initial stand condition is already less than the target specified, the thinning will be cancelled. Look at the "Activity Summary" portion of the standard FVS output to see which requests were implemented and which were cancelled.

Note: A thinning is always done in the first year of the cycle in which it is scheduled, even if the year entered in field 1 is not the first year of the cycle. If a thinning must occur in a particular year, a TIMEINT keyword may be needed to change the length of a cycle so that the desired year for the thinning becomes the first year of a cycle.

Note: Multiple thinning keywords can be scheduled for the same year to simulate different aspects of a single harvest. Care must be taken to ensure that the dbh and height ranges do not unintentionally overlap, or the residual may not be what was expected. Total residuals must be calculated carefully.

Note: If both the basal area per acre target and the trees per acre target are specified on the same keyword, the trees per acre target is used.

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 24

THINHT

(THIN from a HeighT range)
Variants: All
Related keywords: THINxxx, CUTEFF

Schedules a thinning from throughout a specified height range for any or all species to a basal area per acre or trees per acre target. If the target trees per acre or target basal area is nonzero, thinning occurs uniformly throughout the specified height range until one of the targets is met (cutting efficiency is ignored). In other words, a calculated proportion of each of the eligible tree records is removed such that the target trees per acre or target basal area is exactly met. If both residual targets are 0 (zero), the cutting efficiency determines the proportion of trees represented by each eligible tree record that will be removed (residual targets are ignored). Only trees of the user-specified species that are within the user-defined height range are considered for removal. The residual target basal area or trees per acre is specified only for that species and height range, and does *not* represent the total residual unless the height range includes all trees of all species in the stand.

field 1: Year or cycle that thinning is scheduled. *Default = 1*

field 2: Shortest tree in feet to be considered for removal (greater than or equal). *Default = 0*

field 3: Tallest tree in feet to be considered for removal (less than). *Default = 999*

field 4: Cutting efficiency parameter specific to this thinning request (refer to the CUTEFF keyword for description). *Range: 0.01-1.0, Default = 1*

field 5: Species code for trees to be removed in this cut. *Default = All*

field 6: Target trees per acre for the segment of the height distribution of the species defined in fields 2, 3, and 5. *Default = 0*

field 7: Target basal area in square feet per acre for the segment of the height distribution of the species defined in fields 2, 3, and 5. *Default = 0*

Caution: The specified residual target is for the user-specified species and user-defined range of height only. The total residual will also include all trees that do not fall within this range.

Caution: The Removal Priority Algorithm is not invoked with this keyword, therefore SPECPREF TCONDMLT and MISTPREF keywords have no effect on thinnings that use THINHT.

Caution: If a thinning keyword is embedded in an event monitor sequence, year (field 1) is interpreted as years from the time the condition is true until implementation, or in other words, a lag time. (e.g. a 5 in field 1 means wait 5 years after condition is true to thin the stand.)

Note: If the initial stand condition is already less than the target specified, the thinning will be cancelled. Look at the "Activity Summary" portion of the standard FVS output to see which requests were implemented and which were cancelled.

Note: A thinning is always done in the first year of the cycle in which it is scheduled, even if the year entered in field 1 is not the first year of the cycle. If a thinning must occur in a particular year, a TIMEINT keyword may be needed to change the length of a cycle so that the desired year for the thinning becomes the first year of a cycle.

Note: Multiple thinning keywords can be scheduled for the same year to simulate different aspects of a single harvest. Care must be taken to ensure that the dbh and height ranges do not unintentionally overlap, or the residual may not be what was expected. Total residuals must be calculated carefully.

Note: If both the basal area per acre target and the trees per acre target are specified on the same keyword, the trees per acre target is used.

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

THINPRSC

(THIN by PReSCription)
Variants: All
Related keywords: THINxxx, CUTEFF

Schedules a thinning based on prescription code. Prescription codes are numeric codes that are found in the input tree records (column 49). Prescription codes are user-defined, and have no inherent meaning in FVS. They are only useful in conjunction with this keyword. For example, if tree records that are to be removed have prescription code 2, and those that are to be left have prescription code 1, then field 3 of the THINPRSC keyword will be 2 and trees with that prescription code will be removed. The cutting efficiency determines the proportion of trees represented by a tree record that will be removed if that tree record contains the specified prescription code.

field 1: Year or cycle that prescription thinning is scheduled. *Default = 1*

field 2: Cutting efficiency parameter specific to this thinning request (refer to the CUTEFF keyword for description). *Range: 0.01-1.0, Default = 1*

field 3: Prescription code for trees that are to be removed in this thinning. *Range: 0-9*

Caution: If a thinning keyword is embedded in an event monitor sequence, year (field 1) is interpreted as years from the time the condition is true until implementation, or in other words, a lag time. (e.g. a 5 in field 1 means wait 5 years after condition is true to thin the stand.)

Note: It may help to think of the prescription code in the input tree records (column 49) as a number painted on the live trees in the stand. Then think of the prescription code identified in this keyword (field 3) as instructing the harvest crew to cut trees with the identified number painted on them. The cutting efficiency determines the proportion of these trees to be cut.

Note: Prescription codes in the input tree records can be edited in a text editor. There is also an editing feature available through the Suppose interface program that displays the tree data in a template form that contains field descriptions. This feature is accessible through the "Edit FVS Tree Data" item in the "Options" menu.

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

THINSDI

(THIN to Stand Density Index target)
Variants: All
Related keywords: THINxxx, SPECPREF, TCONDMLT, CUTEFF

Schedules a thinning from a specified dbh range for any, or all, species to a stand density index target. If the target stand density index is nonzero and the cutting control flag is zero, thinning occurs uniformly throughout the specified dbh range until the target is met (the cutting efficiency parameter is ignored and the cutting efficiency needed to complete the thinning is automatically computed by the program). If the target stand density index is nonzero and the cutting control flag is nonzero, then the cutting efficiency parameter is used, along with the Removal Priority Algorithm. Only trees of the user-specified species that are within the user-defined dbh range are considered for removal. The residual target stand density index is specified only for that species and dbh range, and does *not* represent the total residual unless the dbh range includes all trees of all species in the stand.

field 1: Year or cycle that thinning is scheduled. *Default = 1*

field 2: Residual Stand Density Index (SDI). *Default = 0*

field 3: Cutting efficiency parameter specific to this thinning request (refer to the CUTEFF keyword). *Range: 0.01-1.0, Default = model computed*

field 4: Species code for trees to be removed in this cut. *Default = 0 (All)*

field 5: Smallest dbh in inches to be considered for removal (greater than or equal). *Default = 0.0*

field 6: Largest dbh in inches to be considered for removal (less than). *Default = 999.0*

field 7: Cutting control flag. *Default = 0*
0 = thin throughout the specified diameter range
1 = thin from below in the specified diameter range
2 = thin from above in the specified diameter range.

Caution: The specified residual target is for the user-specified species and user-defined range of dbh only. The total residual will also include all trees that do not fall within this range.

Caution: The Removal Priority Algorithm is only used when the cutting control flag is nonzero, (reference: SPECPREF and TCONDMLT keywords)

Caution: If a thinning keyword is embedded in an event monitor sequence, year (field 1) is interpreted as years from the time the condition is true until implementation, or in other words, a lag time. (e.g. a 5 in field 1 means wait 5 years after condition is true to thin the stand.)

Note: If the initial stand condition is already less than the target specified, the thinning will be cancelled. Look at the "Activity Summary" portion of the standard FVS output to see which requests were implemented and which were cancelled.

Note: A thinning is always done in the first year of the cycle in which it is scheduled, even if the year entered in field 1 is not the first year of the cycle. If a thinning must occur in a particular year, a TIMEINT keyword may be needed to change the length of a cycle so that the desired year for the thinning becomes the first year of a cycle.

Note: Multiple thinning keywords can be scheduled for the same year to simulate different aspects of a single harvest. Care must be taken to ensure that the dbh and height ranges do not unintentionally overlap, or the residual may not be what was expected. Total residuals must be calculated carefully.

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 24

TIMEINT

(TIME INTerval)
Variants: All
Related keywords: NUMCYCLE, INVYEAR

Specifies the length, in years, of any or all projection cycles. Many actions (e.g. thinnings) in FVS are implemented in the first year of the cycle in which they are scheduled, regardless of the actual year in the cycle that the action was scheduled. The only way to ensure that an action can be implemented in the same year that it is scheduled is to schedule the action in the first year of a cycle. This may not be possible if the cycles are left at their default length of ten years. A TIMEINT keyword can be used to change the length of a cycle so that the desired year for a particular action becomes the first year of a cycle.

field 1: Cycle number whose length is to be changed. Enter 0 (zero) to change the length of all projection cycles. *Default = 1*

field 2: Cycle length in years for the cycle(s) referenced in field 1. *Default = 10 (NC default = 5)*

Note: This keyword affects only the specified cycle(s). The cycle immediately following does *not* represent the remainder of a cycle to return the simulation to the same cycle break

years. Instead, subsequent cycles are affected by other TIMEINT keywords, or are assigned default lengths.

Note: Multiple TIMEINT keywords can be scheduled for a simulation. If multiple TIMEINT keywords are scheduled to affect any particular cycle, the last encountered use of the keyword will override the effects of all the previous.

Note: The Suppose interface program automatically includes a TIMEINT keyword whenever there are stands in a simulation that have different inventory years. The TIMEINT keyword is used to change the first cycle for stands that were inventoried earlier to bring all the simulations so a common year. Simulations for these stands will contain one additional cycle. From that point the simulations run with default cycle length.

Reference: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 8

TOPKILL

(TOPKILL trees)
Variants: All
Related keywords: HTGSTOP, CRNMULT

Kills a portion of the top of trees for randomly selected tree records that fall within the user-specified parameters for species and height. This can be used to simulate damage from insects or logging.

field 1: Year or cycle in which topkill is to be applied. *Default = 1*

field 2: Species code for which topkill is to be applied. *Default = All*

field 3: Shortest tree in feet (greater than or equal) that will be affected. *Default = 0*

field 4: Tallest tree in feet (less than) that will be affected. *Default = 0*

field 5: Probability that a tree will sustain topkill. *Range: 0.0 - 1.0, Default = 0.0*

field 6: Mean proportion of total tree height lost to topkill (e.g. 0.2 will kill an average of 20% of the total height on selected trees). *Default = 1.0*

field 7: Standard deviation of the distribution of the proportion of total tree height killed. This allows for variability in topkill proportion among the selected trees. *Default = 0.0*

Note: Once a tree record has been affected by a TOPKILL keyword it will not get taller for the remainder of the simulation. Truncated height will be reported to the point of topkill. Reported volumes are calculated using the truncated height, however the old total tree height is used to determine stem form.

Note: The PARMS format may be used with this keyword. See the introduction for a description of this format.

Reference: GTR INT-208, Supplement to the User's Guide..., p. 20

TREEDATA

(TREE DATA file)
Variants: All
Related keywords: TREEFMT, SPCODES, OPEN

Specifies a file reference number for reading in tree data records. If this references an external file, a corresponding OPEN keyword must also be included. If the file reference number is 15, then tree data records are inserted directly into the keyword file as supplemental records to this keyword (the last supplemental record must be -999 to signify the end of the tree data records). Refer to TREEFMT for a description of the input format.

field 1: File reference number for the input tree data file. File reference numbers are a mechanism that FVS uses to keep track of external files. Numbers less than 30 are reserved for files that are currently used by FVS. If this field has a value of 15 then tree data records are entered as supplemental records. *Default = 2*

field 2: Flag to include plot specific site descriptors. Any numeric entry causes FVS to read plot descriptors from the tree data (columns 50-59). This information can be used by the Regeneration Establishment model.

field 3: Smallest dbh in inches to be considered for input (greater than or equal). All tree records with dbh less than this value will be ignored. *Default = 0.0*

field 4: Largest dbh in inches to be considered for input (less than). All tree records with dbh greater than or equal to this value will be ignored. *Default = 999.0*

Caution: If a TREEFMT keyword is used, it must precede the TREEDATA keyword.

Note: The Suppose interface program automatically includes a TREEDATA keyword to read tree records from the file identified in the stand list file. The corresponding OPEN and CLOSE keywords are also included automatically.

References: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 18
GTR INT-208, Supplement to the User's Guide..., p. 17
GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 24

TREEFMT

(TREE data FormaT)
Variants: All
Related keywords: SPCODES, TREEDATA

Provides a FORTRAN format statement that describes the layout of the tree data record. The following is the default tree format used to read the input tree variables

(I4,T1,I7,F6.0,I1,A3,F4.1,F3.1,2F3.0,F4.1,I1,6I2,2I1,I2,2I3,2I1)

Where: I indicates "read as an integer" and the trailing number indicates the number of columns to read (e.g. I4 indicates 4 columns are to be read as integer input).
F indicates "read as decimal input" and the trailing numeric code indicates the total number of columns and number of decimal places (e.g. F4.1 indicates 4 columns are to be read as decimal input and 1 decimal place will be kept. If no decimal point is present, the last digit is assumed to be tenths).
A indicates "read as alpha characters" and the trailing number indicates the number of columns to read (e.g. A3 indicates 3 columns are to be read, and letters or other characters may be present. Blanks are read in as well).

T indicates a tab to a specific column. The trailing number indicates the column of the first character to be read using the next format listed.

Commas (,) separate individual format specifications.

Numbers that precede a letter indicate that the format specification is repeated that number of times (e.g. 2I3 is equivalent to I3,I3).

No fields are associated with this keyword. The format statement is entered on two supplemental records.

Supplemental records:

Two supplemental records are required, each a maximum of 80 characters long. The supplemental records comprise a FORTRAN format statement of the type described above. If the entire format statement is included in a single supplemental record, the second supplemental record will be blank, but it must still be included.

Example:

```
TREEFMT
(I2,T1,I6,T10,F7.1,I1,T8,A2,T16F5.2,F3.1,
2F3.0,F4.1,I1,T80,6I2,2I1,I2,2I3,2I1)
```

Default Tree Data Input Format

VARIABLE	*FORMAT*	*COLUMNS*
Plot ID	I4	1-4
Tree Number	I7	1-7
Tree Count	F6.0	8-13
Tree History	I1	14
Species	A3	15-17
Diameter at Breast Height	F4.1	18-21
DBH Increment	F3.1	22-24
Live Height	F3.0	25-27
Height to Top Kill	F3.0	28-30
Height Increment	F4.1	31-34
Crown Ratio Code	I1	35
Damage Code 1	I2	36-37
Severity Code 1	I2	38-39
Damage Code 2	I2	40-41
Severity Code 2	I2	42-43
Damage Code 3	I2	44-45
Severity Code 3	I2	46-47
Tree Value Class Code	I1	48
Cut/Leave Prescription Code	I1	49
Plot slope percent	I2	50-51
Plot aspect in degrees	I3	52-54
Plot habitat type code	I3	55-57
Plot topographic position code	I1	58
Plot site preparation code	I1	59

Caution: If a TREEDATA keyword is used, it must follow the TREEFMT keyword.

Caution: If decimal input was specified in the format statement but no decimal point appears in the input, the decimal point will be assumed and its placement will be determined by the format statement. For example, the format statement F4.1 will cause input of 1234 to be read as 123.4.

Caution: Tree count is used in conjunction with the plot design information in the DESIGN keyword to determine the number of trees per acre each record represents. For example, a single seedling (tree count = 1) on one of five 1/100 acre fixed plots represents 20 seedlings per acre in the stand.

Note: Species and dbh are required fields. It is also suggested that minimally plot ID, tree count, tree history, and live height are included. In the absence of corresponding data, each tree record will be assumed to represent one live tree, all will be assumed to have been recorded on a single plot.

Note: If fields were not included in the tree data records tab to blank data columns and read blank data for those fields.

Note: If all tree records are ultimately reported by FVS as "other species" or something similar, an error has probably been made in the preparation of either the TREEFMT or SPCODES keywords.

Note: The Suppose interface program automatically includes a TREEFMT keyword with the default format. If the tree data records are in a different format, an additional TREEFMT keyword must be added with the proper format statement.

References: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 19

TREELIST

(TREELIST file)
Variants: All
Related keywords: CUTLIST, OPEN

Prints a list of tree records to an output treelist file.

field 1: Year or cycle in which treelist is to be printed. Enter 0 (zero) to print output for every cycle. *Default = 1*

field 2: File reference number for the output file. File reference numbers are a mechanism that FVS uses to keep track of external files. Numbers less than 30 are reserved for files that are currently used by FVS. *Default = 3*

field 3: Value to determine which header will be printed with the treelist. *Default = 0*

1	Encoded header record (machine readable, -999)
0	Header records describing each column (human readable)
-1	Suppress all headers

field 4: Cycle 0/1 treelist printing flag. This field is ignored unless field 1 represents the first cycle of the simulation (i.e. field 1 = 1, or field 1 = first year of simulation). *Default = 0*

0	Print both cycle 0 and cycle 1
1	Print only cycle 1
2	Print only cycle 0 (beginning of simulation)

field 5: Live/dead treelist flag. A value of 1 (one) requests a dead tree list. Any other value requests the normal live and recent mortality treelist. *Default = 0*

field 6: Treelist format. *Default = 0*

0	Current format
1	Old version 6.1 format

field 7: Diameter increment printing for cycle 0. *Default = 0*

0	Print only cycle 0 dbh increments that were read from the input tree data
1	Print both cycle 0 input and cycle 0 estimated dbh increments

Note: If the TREELIST output is intended for use with post-processing programs, it must contain headers and be in the current format (i.e. field 3 must be 0, 1, or blank, and field 6 must be 0 or blank).

Note: If using the Suppose interface program the TREELIST output file, by default, has the same base name as the simulation file with a *.trl* extension. This is the same file used, by default, for the CUTLIST output.

References: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 47
GTR INT-208, Supplement to the User's Guide..., p. 14

VOLUME

(cubic foot VOLUME)
Variants: All
Related keywords: BFVOLUME, MCDEFECT, CFVOLEQU, MCFDLN

Sets the merchantability limits for merchantable cubic foot volume equations. In the eastern half of the US, this keyword sets the merchantability limits only for the pulpwood that is smaller than the merchantable limits for sawlogs. (The merchantability limits for the sawlog portion of pulpwood trees can be set with the BFVOLUME keyword.)

field 1: Year or cycle number in which merchantability limits are to take affect. Once in effect they remain in effect until replaced by subsequent limits.
Default = 0 (all cycles)

field 2: Species code for which the limits are to be changed. *Default = All*

field 3: Minimum merchantable DBH in inches.
Defaults by variant:

SE, SN	*4.0*
CR	*5.0*
CS, LS, NE	*hardwoods: 6.0, softwoods: 5.0*
WS	*7.0*
CA	*7.0 (knobcone pine: 6.0)*
BM, EC, EM, NI, KT, PN, WC	*7.0 (lodgepole pine: 6.0)*
CI, TT, UT	*8.0 (lodgepole pine: 7.0)*
NC, SO	*9.0*
AK	*hardwoods: 11.0, softwoods: 9.0*

field 4: Minimum top diameter (inside bark (DIB) in the eastern US, outside bark (DOB) in the western US).
Defaults by variant:

CR, CS, LS, NE	*4.0*

SE, SN	*4.0 (This value is fixed in SE and SN. Changing it will cause reported merchantable cubic foot volumes to be zero.)*
BM,CA,EC,EM,KT,NI,PN,WC,WS	*4.5*
CI, NC, SO, TT, UT	*6.0*
AK	*hardwoods: 8.0, softwoods: 6.0*

field 5: Stump height in feet. *Default = 1.0*

field 6: Form class (Region 5 ignores this field). *Default = 80 (Region 6 defaults vary by forest, species and diameter class)*

field 7: Volume calculation method. *Default = 6 (CR in Region 3: default = 8)*

1	Wykoff, Allen, et. al. , or user defined equation if CFVOLEQU keyword is used.
2	Region 6 Eastside taper equations.
3	Region 6 Westside taper equations.
6	National Volume Estimator Library equations.
7	Wykoff, Allen, et. al. , or user defined equation if CFVOLEQU keyword is used (same as option 1).
8	Other volume equations:
AK	*Bruce and Demars equations formerly in FVS.*
CR	*Hann and Bare equations (region 2 forests use coefficients from the Cibola NF).*
CS,LS,NE	*TWIGS volume equations.*
NC	*Western Sierra log rules.*

Caution: If an entry is made in field 7, it must agree with the entry in field 7 of the BFVOLUME keyword

Note: For any particular species this keyword remains in effect until a subsequent use of the keyword changes the limits for that species.

References: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 22
GTR INT-208, Supplement to the User's Guide..., p. 18

YARDLOSS (YARDing LOSS)

Variants: All
Related keywords: THINxxx

Designates a portion of a harvest to be left in the woods. This may reduce harvest volumes and is also used in determining fuel loading for the fire extension model.

field 1: Year or cycle in which harvesting is to incur yarding loss. *Default = 1*

field 2: Proportion of harvest not removed from the stand. *Range: 0.0-1.0, Default = 0*

field 3: Proportion of non-removed harvest that is down. *Range: 0.0-1.0, Default = 0*

field 4: Proportion of harvested crowns left in the stand. *Range: 0.0-1.0, Default = 0*

Note: This keyword works in conjunction with the thinning keywords. A thinning that is scheduled for the same cycle as the YARDLOSS keyword is in effect will reflect the losses specified.

Note: Keyword order may be important. If a YARDLOSS keyword is specified for the *same year* that a thinning keyword is specified, the losses will be applied to the thinning only if the YARDLOSS keyword appears in the keyword sequence before the thinning keyword

Appendix A: Species Codes by Variant

An alphabetical list by species code follows the variant-specific tables.

AK — Southeast Alaska, Coastal British Columbia (SEAPROG)

Sequence number	Species code	Species name	Sequence number	Species code	Species name
1	WS	White spruce	8	SS	Sitka spruce
2	RC	Western redcedar	9	AF	Subalpine fir
3	SF	Pacific silver fir	10	RA	Red alder
4	MH	Mountain hemlock	11	CW	Black cottonwood
5	WH	Western hemlock	12	OH	Other hardwoods
6	YC	Yellow-cedar	13	OS	Other softwoods
7	LP	Lodgepole pine			

BM — Blue Mountains

Sequence number	Species code	Species name	Sequence number	Species code	Species name
1	WP	Western white pine	7	LP	Lodgepole pine
2	WL	Western larch	8	ES	Engelmann spruce
3	DF	Douglas-fir	9	AF	Subalpine fir
4	GF	Grand fir/White fir	10	PP	Ponderosa pine
5	MH	Mountain hemlock	11	OT	Other species
6	- -				

CA — Inland California, Southern Cascades (ICASCA)

Sequence number	Species code	Species name	Sequence number	Species code	Species name
1	PC	Port-Orford-cedar	26	LO	Coast live oak
2	IC	Incense-cedar	27	CY	Canyon live oak
3	RC	Western redcedar	28	BL	Blue oak
4	WF	White fir	29	EO	Engelmann oak
5	RF	California red fir	30	WO	Oregon white oak
6	SH	Shasta red fir	31	BO	California black oak
7	DF	Douglas-fir	32	VO	Valley white oak
8	WH	Western hemlock	33	IO	Interior live oak
9	MH	Mountain hemlock	34	BM	Bigleaf maple
10	WB	Whitebark pine	35	BU	California buckeye
11	KP	Knobcone pine	36	RA	Red alder
12	LP	Lodgepole pine	37	MA	Pacific madrone
13	CP	Coulter pine	38	GC	Golden chinkapin
14	LM	Limber pine	39	DG	Pacific dogwood
15	JP	Jeffrey pine	40	FL	Oregon ash
16	SP	Sugar pine	41	WN	Walnut
17	WP	Western white pine	42	TO	Tanoak
18	PP	Ponderosa pine	43	SY	California sycamore
19	MP	Monterey pine	44	AS	Quaking aspen
20	GP	Gray pine	45	CW	Black cottonwood
21	JU	Western juniper	46	WI	Willow
22	BR	Brewer spruce	47	CN	California nutmeg
23	GS	Giant sequoia	48	CL	California-laurel
24	PY	Pacific yew	49	OH	Other hardwoods
25	OS	Other softwoods			

CI — Central Idaho

Sequence number	Species code	Species name	Sequence number	Species code	Species name
1	WP	Western white pine	7	LP	Lodgepole pine
2	WL	Western larch	8	ES	Engelmann spruce
3	DF	Douglas-fir	9	AF	Subalpine fir
4	GF	Grand fir	10	PP	Ponderosa pine
5	WH	Western hemlock	11	OT	Other species
6	RC	Western redcedar			

CR — Central Rockies (GENGYM) - All submodels

Sequence number	Species code	Species name	Sequence number	Species code	Species name
1	AF	Subalpine fir	13	PP	Ponderosa pine
2	CB	Corkbark fir	14	WB	Whitebark pine
3	DF	Douglas-fir	15	WP	Southwestern white pine
4	GF	Grand fir	16	JU	Western juniper
5	WF	White fir	17	BS	Blue spruce
6	MH	Mountain hemlock	18	ES	Engelmann spruce
7	RC	Western redcedar	19	WS	White spruce
8	WL	Western larch	20	AS	Quaking aspen
9	BC	Bristlecone pine	21	CO	Plains cottonwood
10	LM	Limber pine	22	OA	Gambel oak
11	LP	Lodgepole pine	23	OS	Other softwoods
12	PI	Pinyon pine	24	OH	Other hardwoods

EC — Eastside Cascades

Sequence number	Species code	Species name	Sequence number	Species code	Species name
1	WP	Western white pine	7	LP	Lodgepole pine
2	WL	Western larch	8	ES	Engelmann spruce
3	DF	Douglas-fir	9	AF	Subalpine fir
4	SF	Pacific silver fir	10	PP	Ponderosa pine
5	RC	Western redcedar	11	OT	Other species
6	GF	Grand fir			

EM — Eastern Montana

Sequence number	Species code	Species name	Sequence number	Species code	Species name
1	WB	Whitebark pine	7	LP	Lodgepole pine
2	L	Western larch	8	S	Engelmann spruce
3	DF	Douglas-fir	9	AF	Subalpine fir
4	- -		10	PP	Ponderosa pine
5	- -		11	OT	Other species
6	- -				

CS — Central States (CS TWIGS)

Sequence number	Species code	Species name	Sequence number	Species code	Species name
1	RC	Eastern redcedar	49	SK	Southern red oak
2	JU	Juniper	50	BO	Black oak
3	SP	Shortleaf pine	51	SO	Scarlet oak
4	VP	Virginia pine	52	BJ	Blackjack oak
5	LP	Loblolly pine	53	CK	Chinkapin oak
6	OS	Other softwoods	54	SW	Swamp white oak
7	WP	White pine	55	BR	Bur oak
8	WN	Black walnut	56	SN	Swamp chestnut oak
9	BN	Butternut	57	PO	Post oak
10	TL	Tupelo	58	DO	Delta post oak
11	TS	Swamp tupelo/sw. blackgum	59	CO	Chestnut oak
12	WT	Water tupelo	60	PN	Pin oak
13	BG	Blackgum/black tupelo	61	CB	Cherrybark oak
14	HS	Select hickory	62	QI	Shingle oak
15	SH	Shagbark hickory	63	OV	Overcup oak
16	SL	Shellbark hickory	64	WK	Water oak
17	MH	Mockernut hickory	65	NK	Nuttall oak
18	PH	Pignut hickory	66	WL	Willow oak
19	HI	Hickory	67	QS	Shumard oak
20	WH	Water hickory	68	UH	Other upland hardwoods
21	BH	Bitternut hickory	69	SS	Sassafras
22	PE	Pecan	70	OB	Ohio buckeye
23	BI	Black hickory	71	CA	Catalpa
24	AB	American beech	72	PS	Persimmon
25	BA	Black ash	73	HL	Honey locust
26	PA	Pumpkin ash	74	BP	Balsam poplar
27	UA	Blue ash	75	BT	Bigtooth aspen
28	CW	Cottonwood	76	QA	Quaking aspen
29	RM	Red maple	77	BK	Black locust
30	BE	Boxelder	78	OL	Other lowland species
31	SV	Silver maple	79	SY	Sycamore
32	BC	Black cherry	80	BY	Baldcypres
33	AE	American elm	81	RB	River birch
34	SG	Sugarberry	82	SU	Sweetgum
35	HB	Hackberry	83	WI	Willow
36	WE	Winged elm	84	BL	Black willow
37	EL	Elm	85	NC	Non-commercial species
38	SI	Siberian elm	86	AH	Blue beech
39	RL	Red elm	87	RD	Redbud
40	RE	Rock elm	88	DW	Dogwood
41	YP	Yellow-poplar	89	HT	Hawthorn
42	BW	American basswood	90	KC	Kentucky coffeetree
43	SM	Sugar maple	91	OO	Osage-orange
44	AS	Ash	92	CT	Cucumber tree
45	WA	White ash	93	MV	Sweetbay
46	GA	Green ash	94	MB	Mulberry
47	WO	White oak	95	HH	American hophornbeam
48	RO	Northern red oak	96	SD	Sourwood

KT — Kootenai/Kaniksu/Tally Lake - Flathead (KOOKANTL)

Sequence number	Species code	Species name	Sequence number	Species code	Species name
1	WP	Western white pine	7	LP	Lodgepole pine
2	L	Western larch	8	S	Engelmann spruce
3	DF	Douglas-fir	9	AF	Subalpine fir
4	GF	Grand fir	10	PP	Ponderosa pine
5	WH	Western hemlock	11	OT	Other species
6	C	Western redcedar			

LS — Lake States (LS TWIGS)

Sequence number	Species code	Species name	Sequence number	Species code	Species name
1	JP	Jack pine	35	BO	Black oak
2	SC	Scotch pine	36	NP	Northern pin oak
3	RN	Red pine natural	37	BH	Bitternut hickory
4	RP	Red pine plantation	38	PH	Pignut hickory
5	WP	White pine	39	SH	Shagbark hickory
6	WS	White spruce	40	BT	Bigtooth aspen
7	NS	Norway spruce	41	QA	Quaking aspen
8	BF	Balsam fir	42	BP	Balsam poplar
9	BS	Black spruce	43	PB	Paper birch
10	TA	Tamarack	44	CH	Other commercial hardwoods
11	WC	Northern white-cedar	45	BN	Butternut
12	EH	Eastern hemlock	46	WN	Black walnut
13	OS	Other softwoods	47	HH	Eastern hophornbeam
14	RC	Eastern redcedar	48	BK	Black locust
15	BA	Black ash	49	NC	Non-commercial hardwoods
16	GA	Green ash	50	BE	Boxelder
17	CW	Cottonwood	51	ST	Striped maple
18	SV	Silver maple	52	MM	Mountain maple
19	RM	Red maple	53	AH	American hornbeam
20	BC	Black cherry	54	AC	American chestnut
21	AE	American elm	55	HB	Hackberry
22	RL	Slippery elm	56	DW	Flowering dogwood
23	RE	Rock elm	57	HT	Hawthorn
24	YB	Yellow birch	58	AP	Apple
25	BW	Basswood	59	BG	Blackgum
26	SM	Sugar maple	60	SY	Sycamore
27	BM	Black maple	61	PR	Pin cherry
28	AB	American beech	62	CC	Choke cherry
29	WA	White ash	63	PL	Plum
30	WO	White oak	64	WI	Willow
31	SW	Swamp white oak	65	BL	Black willow
32	BR	Bur oak	66	DM	Diamond willow
33	CK	Chinkapin oak	67	SS	Sassafras
34	RO	Northern red oak	68	MA	American mountain-ash

NE — Northeast (NE TWIGS)

Sequence	Code	Species name	Sequence	Code	Species name
1	BF	Balsam fir	55	WO	White oak
2	TA	Tamarack	56	BR	Bur oak
3	WS	White spruce	57	CK	Chinkapin oak
4	RS	Red spruce	58	PO	Post oak
5	NS	Norway spruce	59	OK	Other oaks
6	BS	Black spruce	60	SO	Scarlet oak
7	PI	Other spruce	61	QI	Shingle oak
8	RN	Red pine	62	WK	Water oak
9	WP	Eastern white pine	63	NP	Northern pin oak
10	LP	Loblolly pine	64	CO	Chestnut oak
11	VP	Virginia pine	65	SW	Swamp white oak
12	WC	Northern white-cedar	66	SN	Swamp chestnut oak
13	AW	Atlantic white-cedar	67	RO	Northern red oak
14	RC	Eastern redcedar	68	SK	Southern red oak
15	OC	Other cedar	69	BO	Black oak
16	EH	Eastern hemlock	70	CB	Cherrybark oak
17	HM	Other hemlock	71	OH	Other hardwoods
18	OP	Other pines	72	BU	Buckeye
19	JP	Jack pine	73	YY	Yellow buckeye
20	SP	Shortleaf pine	74	WR	Water birch
21	TM	Table mountain pine	75	HB	Hackberry
22	PP	Pitch pine	76	PS	Persimmon
23	PD	Pond pine	77	HY	American holly
24	SC	Scotch pine	78	BN	Butternut
25	OS	Other softwoods	79	WN	Black walnut
26	RM	Red maple	80	OO	Osage-orange
27	SM	Sugar maple	81	MG	Magnolia
28	BM	Black maple	82	MV	Sweetbay
29	SV	Silver maple	83	AP	Apple
30	YB	Yellow birch	84	WT	Water tupelo
31	SB	Sweet birch	85	BG	Blackgum
32	RB	River birch	86	SD	Sourwood
33	PB	Paper birch	87	PW	Paulownia
34	GB	Gray birch	88	SY	Sycamore
35	HI	Hickory	89	WL	Willow oak
36	PH	Pignut hickory	90	BK	Black locust
37	SL	Shellbark hickory	91	BL	Black willow
38	SH	Shagbark hickory	92	SS	Sassafras
39	MH	Mockernut hickory	93	BW	American basswood
40	AB	American beech	94	WB	White basswood
41	AS	Ash	95	EL	Other elm
42	WA	White ash	96	AE	American elm
43	BA	Black ash	97	RL	Slippery elm
44	GA	Green ash	98	NC	Non-commercial species
45	PA	Pumpkin ash	99	BE	Boxelder
46	YP	Yellow-poplar	100	ST	Striped maple
47	SU	Sweetgum	101	AI	Ailanthus
48	CT	Cucumbertree	102	SE	Serviceberry
49	QA	Quaking aspen	103	AH	American hornbeam
50	BP	Balsam poplar	104	DW	Flowering dogwood
51	EC	Eastern cottonwood	105	HT	Hawthorn
52	BT	Bigtooth aspen	106	HH	Eastern hophornbeam
53	PY	Swamp cottonwood	107	PL	Plum, cherry
54	BC	Black cherry	108	PR	Pin cherry

NC — Northern California (Klamath Mountains)

Sequence number	Species code	Species name	Sequence number	Species code	Species name
1	OC	Other conifers	7	BO	California black oak
2	SP	Sugar pine	8	TO	Tanoak
3	DF	Douglas-fir	9	RF	Red fir
4	WF	White fir	10	PP	Ponderosa pine
5	M	Madrone	11	OH	Other hardwoods
6	IC	Incense-cedar			

NI — North Idaho (Inland Empire)

Sequence number	Species code	Species name	Sequence number	Species code	Species name
1	WP	Western white pine	7	LP	Lodgepole pine
2	L	Western larch	8	S	Engelmann spruce
3	DF	Douglas-fir	9	AF	Subalpine fir
4	GF	Grand fir	10	PP	Ponderosa pine
5	WH	Western hemlock	11	OT	Other species
6	C	Western redcedar			

PN — Pacific Northwest Coast

Sequence number	Species code	Species name	Sequence number	Species code	Species name
1	SF	Pacific silver fir	21	BM	Bigleaf maple
2	WF	White fir	22	RA	Red alder
3	GF	Grand fir	23	WA	White alder/Pacific madrone
4	AF	Subalpine fir	24	PB	Western paper birch
5	RF	California red fir	25	GC	Giant chinkapin/Tanoak
6	SS	Sitka spruce	26	AS	Quaking aspen
7	NF	Noble fir	27	CW	Black cottonwood
8	YC	Yellow-cedar/Western larch	28	WO	OR white oak/CA black oak
9	IC	Incense-cedar	29	J	Juniper
10	ES	Engelmann spruce	30	LL	Subalpine larch
11	LP	Lodgepole pine	31	WB	Whitebark pine
12	JP	Jeffrey pine	32	KP	Knobcone pine
13	SP	Sugar pine	33	PY	Pacific yew
14	WP	Western white pine	34	DG	Pacific dogwood
15	PP	Ponderosa pine	35	HT	Hawthorn
16	DF	Douglas-fir	36	CH	Bitter cherry
17	RW	Coast redwood	37	WI	Willow
18	RC	Western redcedar	38	--	
19	WH	Western hemlock	39	OT	Other species
20	MH	Mountain hemlock			

SE — Southeast (SE TWIGS)

Sequence number	Species code	Species name	Sequence number	Species code	Species name
1	RC	Eastern redcedar	53	KC	Kentucky coffeetree
2	JU	Juniper	54	HY	American holly
3	SP	Shortleaf pine	55	BN	Butternut
4	SA	Slash pine	56	WN	Black walnut
5	SR	Spruce pine	57	SU	Sweetgum
6	LL	Longleaf pine	58	YP	Yellow-poplar
7	PZ	Ponderosa pine	59	OO	Osage-orange
8	PP	Pitch pine	60	CT	Cucumbertree
9	PD	Pond pine	61	MG	Southern magnolia
10	WP	Eastern white pine	62	MV	Sweetbay
11	LP	Loblolly pine	63	MB	Mulberry
12	VP	Virginia pine	64	WM	White mulberry
13	BY	Baldcypress	65	RY	Red mulberry
14	PC	Pondcypress	66	WT	Water tupelo
15	EH	Eastern hemlock	67	OG	Ogeechee tupelo
16	MP	Maple	68	BG	Black tupelo
17	CM	Chalk maple	69	TS	Swamp tupelo/sw. blackgum
18	BE	Boxelder	70	HH	Eastern hophornbeam
19	RM	Red maple	71	SD	Sourwood
20	SV	Silver maple	72	RA	Redbay
21	SM	Sugar maple	73	SY	Sycamore
22	OB	Ohio buckeye	74	CW	Cottonwood/poplar
23	BB	Birch	75	BP	Balsam poplar
24	YB	Yellow birch	76	EC	Eastern cottonwood
25	SB	Black/sweet birch	77	BT	Bigtooth aspen
26	RB	River birch	78	QA	Quaking aspen
27	AH	American hornbeam	79	BC	Black cherry
28	HI	Hickory	80	WO	White oak
29	WH	Water hickory	81	SW	Swamp white oak
30	BH	Bitternut hickory	82	SO	Scarlet oak
31	PH	Pignut hickory	83	QN	Bluejack oak
32	PE	Pecan	84	NP	Northern pin oak
33	SL	Shellbark hickory	85	SK	Southern red oak
34	SH	Shagbark hickory	86	CB	Cherrybark oak/swamp red oak
35	BI	Black hickory	87	QI	Shingle oak
36	MH	Mockernut hickory	88	TO	Turkey oak
37	CA	Catalpa	89	LK	Laurel oak
38	HB	Hackberry	90	OV	Overcup oak
39	SG	Sugarberry	91	BR	Bur oak
40	RD	Redbud	92	BJ	Blackjack oak
41	DW	Dogwood	93	SN	Swamp chestnut oak
42	HT	Hawthorn	94	CK	Chinkapin oak
43	PS	Common persimmon	95	WK	Water oak
44	AB	American beech	96	NK	Nuttall oak
45	AS	Ash	97	PN	Pin oak
46	WA	White ash	98	WL	Willow oak
47	BA	Black ash	99	CO	Chestnut oak
48	GA	Green ash	100	RO	Northern red oak
49	PA	Pumpkin ash	101	QS	Shumard oak
50	UA	Blue ash	102	PO	Post oak
51	HL	Honeylocust	103	DO	Delta post oak
52	LB	Loblolly-bay	104	BO	Black oak

Continued next page

SE - *Continued*

105	LO	Live oak	112	EL	Elm
106	DP	Dwarf post oak	113	WE	Winged elm
107	BK	Black locust	114	AE	American elm
108	WI	Willow	115	SI	Siberian elm
109	BL	Black willow	116	RL	Slippery elm
110	SS	Sassafras	117	RE	Rock elm
111	BW	American basswood	118	NC	Non-commercial

SO — South-Central Oregon, Northeast California (SORNEC)

Sequence number	Species code	Species name	Sequence number	Species code	Species name
1	WP	Western white pine	7	LP	Lodgepole pine
2	SP	Sugar pine	8	ES	Engelmann spruce
3	DF	Douglas-fir	9	RF	Red fir/Subalpine fir
4	WF	White fir/Grand fir	10	PP	Ponderosa pine/Jeffrey pine
5	MH	Mountain hemlock	11	OT	Other species
6	IC	Incense-cedar			

TT — Tetons

Sequence number	Species code	Species name	Sequence number	Species code	Species name
1	WB	Whitebark pine	7	LP	Lodgepole pine
2	LM	Limber pine	8	ES	Engelmann spruce
3	DF	Douglas-fir	9	AF	Subalpine fir
4	- -		10	- -	
5	- -		11	OT	Other species
6	AS	Quaking aspen			

UT — Utah

Sequence number	Species code	Species name	Sequence number	Species code	Species name
1	WB	Whitebark pine	8	ES	Engelmann spruce
2	LM	Limber pine	9	AF	Subalpine fir
3	DF	Douglas-fir	10	PP	Ponderosa pine
4	WF	White fir	11	PI	Pinyon pine
5	BS	Blue Spruce	12	JU	Western juniper
6	AS	Quaking aspen	13	OA	Gambel oak
7	LP	Lodgepole pine	14	OT	Other species

SN — Southern

Sequence number	Species code	Species name	Sequence number	Species code	Species name
1	FR	Fir	46	MG	Magnolia
2	JU	Redcedar	47	CT	Cucumbertree
3	PI	Spruce	48	MS	Southern magnolia
4	PU	Sand pine	49	MV	Sweetbay
5	SP	Shortleaf pine	50	ML	Bigleaf magnolia
6	SA	Slash pine	51	AP	Apple
7	SR	Spruce pine	52	MB	Mulberry
8	LL	Longleaf pine	53	WT	Water tupelo
9	TM	Table Mountain pine	54	BG	Blackgum/black tupelo
10	PP	Pitch pine	55	TS	Swamp tupelo/sw. blackgum
11	PD	Pond pine	56	HH	Eastern hophornbeam
12	WP	Eastern white pine	57	SD	Sourwood
13	LP	Loblolly pine	58	RA	Redbay
14	VP	Virginia pine	59	SY	Sycamore
15	BY	Baldcypress	60	CW	Cottonwood
16	PC	Pondcypress	61	BT	Bigtooth aspen
17	HM	Hemlock	62	BC	Black cherry
18	FM	Florida maple	63	WO	White oak
19	BE	Boxelder	64	SO	Scarlet oak
20	RM	Red maple	65	SK	Southern red oak
21	SV	Silver maple	66	CB	Cherrybark oak/swamp red oak
22	SM	Sugar maple	67	TO	Turkey oak
23	BU	Buckeye/horsechestnut	68	LK	Laurel oak
24	BB	Birch	69	OV	Overcup oak
25	SB	Sweet birch/black birch	70	BJ	Blackjack oak
26	AH	American hornbeam	71	SN	Swamp chestnut oak
27	HI	Hickory	72	CK	Chinkapin oak
28	CA	Catalpa	73	WK	Water oak
29	HB	Hackberry	74	CO	Chestnut oak
30	RD	Eastern redbud	75	RO	Northern red oak
31	DW	Flowering dogwood	76	QS	Shumard oak
32	PS	Common persimmon	77	PO	Post oak
33	AB	American beech	78	BO	Black oak
34	AS	Ash	79	LO	Live oak
35	WA	White ash/American ash	80	BK	Black locust
36	BA	Black ash	81	WI	Willow
37	GA	Green ash	82	SS	Sassafras
38	HL	Honeylocust	83	BW	Basswood
39	LB	Loblolly-bay	84	EL	Elm
40	HA	Silverbell	85	WE	Winged elm
41	HY	American holly	86	AE	American elm
42	BN	Butternut	87	RL	Slippery elm
43	WN	Black walnut	88	OS	Other softwoods
44	SU	Sweetgum	89	OH	Other hardwoods
45	YP	Yellow-poplar	90	OT	Other

WC — Westside Cascades

Sequence number	Species code	Species name	Sequence number	Species code	Species name
1	SF	Pacific silver fir	21	BM	Bigleaf maple
2	WF	White fir	22	RA	Red alder
3	GF	Grand fir	23	WA	White alder/Pacific madrone
4	AF	Subalpine fir	24	PB	Paper birch
5	RF	California red fir	25	GC	Giant chinkapin/Tanoak
6	- -		26	AS	Quaking aspen
7	NF	Noble fir	27	CW	Black cottonwood
8	YC	Yellow-cedar/Western larch	28	WO	OR white oak/CA black oak
9	IC	Incense-cedar	29	J	Juniper
10	ES	Engelmann/Sitka spruce	30	LL	Subalpine larch
11	LP	Lodgepole pine	31	WB	Whitebark pine
12	JP	Jeffrey pine	32	KP	Knobcone pine
13	SP	Sugar pine	33	PY	Pacific yew
14	WP	Western white pine	34	DG	Pacific dogwood
15	PP	Ponderosa pine	35	HT	Hawthorn
16	DF	Douglas-fir	36	CH	Bitter cherry
17	RW	Coast redwood	37	WI	Willow
18	RC	Western redcedar	38	- -	
19	WH	Western hemlock	39	OT	Other species
20	MH	Mountain hemlock			

WS — Westside Sierra Nevada (WESSIN)

Sequence number	Species code	Species name	Sequence number	Species code	Species name
1	OC	Other conifers	7	BO	Black oak/other hardwoods
2	SP	Sugar pine	8	JP	Jeffrey pine
3	DF	Douglas-fir	9	RF	California red fir
4	WF	White fir	10	PP	Ponderosa pine
5	GS	Giant sequoia	11	TO	Tanoak/Giant chinkapin
6	IC	Incense-cedar			

Species Codes - All Western Variants

AF	Subalpine fir	HT	Hawthorn	PY	Pacific yew
AS	Quaking aspen	IC	Incense cedar	RA	Red alder
BC	Bristlecone pine	IO	Interior live oak	RC	Western redcedar
BL	Blue oak	J	Juniper species	RF	California red fir
BM	Bigleaf maple	JP	Jeffrey pine	RW	Redwood
BO	California black oak	JU	Juniper species	S	Engelmann spruce
BR	Brewer spruce	KP	Knobcone pine	SF	Pacific silver fir
BS	Blue spruce	L	Western larch	SH	Shasta red fir
BU	California buckeye	LL	Subalpine larch	SP	Sugar pine
C	Western redcedar	LM	Limber pine	SS	Sitka spruce
CH	Bitter cherry	LO	Califomia live oak	SY	California sycamore
CL	California laurel	LP	Lodgepole pine	TO	Tanoak
CN	California nutmeg	M	Pacific madrone	VO	Calif. white (valley) oak
CO	Plains cottonwood	MA	Pacific madrone	WA	White alder
CW	Black cottonwood	MH	Mountain hemlock	WB	Whitebark pine
CY	Canyon live oak	MP	Monterrey pine	WF	White fir
DF	Douglas-fir	NF	Noble fir	WH	Western hemlock
DG	Pacific dogwood	OA	Gambel oak	WI	Willow species
EO	Engelmann oak	OH	Other hardwoods	WL	Western larch
ES	Engelmann spruce	OS	Other softwoods	WN	Walnut species
FL	Oregon Ash	OT	Other species	WO	Oregon white oak
GC	Golden chinkapin	PB	Paper birch	WP	Western white pine
GF	Grand fir	PC	Port-Orford cedar	WS	White spruce
GS	Giant sequoia	PP	Ponderosa pine	YC	Alaska yellow-cedar

Species Codes - All Eastern Variants

AB	American Beech	BR	Bur oak	FR	Fir species
AC	American chestnut	BS	Black spruce	GA	Green ash
AE	American elm	BT	Bigtooth aspen	GB	Gray birch
AH	American hornbeam	BU	Buckeye, Horsechestnut	HA	Silverbell
AI	Ailanthus	BW	American basswood	HB	Hackberry
AP	Apple species	BY	Baldcypress	HH	Eastern hophornbeam
AS	Ash species	CA	Catalpa	HI	Hickory species
AW	Atlantic white-cedar	CB	Cherrybark oak	HL	Honeylocust
BA	Black ash	CC	Chokecherry	HM	Hemlock
BB	Birch species	CH	Commercial hardwoods	HS	Select hickory
BC	Black cherry	CK	Chinkapin oak	HT	Hawthorn
BD	Basswood species	CM	Chalk maple	HY	American holly
BE	Boxelder	CN	Northern catalpa	JP	Jack pine
BF	Balsam fir	CO	Chestnut oak	JU	Redcedar
BG	Blackgum/Black tupelo	CT	Cucumbertree	KC	Kentucky coffeetree
BH	Bitternut hickory	CW	Cottonwood species	LB	Loblolly-bay
BI	Black hickory	DM	Diamond willow	LK	Laurel oak
BJ	Blackjack oak	DO	Delta post oak	LL	Longleaf pine
BK	Black locust	DP	Dwarf post oak/Sand oak	LO	Live oak
BL	Black willow	DW	Flowering dogwood	LP	Loblolly pine
BM	Black maple	EC	Eastern cottonwood	MA	American mountain-ash
BN	Butternut	EH	Eastern hemlock	MB	Mulberry species
BO	Black oak	EL	Elm species	MG	Magnolia species
BP	Balsam poplar	FM	Florida maple	MH	Mockernut hickory

Species Codes - All Eastern Variants Continued

ML	Bigleaf magnolia
MM	Mountain maple
MP	Maple species
MS	Southern magnolia
MV	Sweetbay
NC	Noncommercial
NK	Nutall oak
NP	Northern pin oak
NS	Norway spruce
OB	Ohio buckeye
OC	Other cedar
OG	Ogeechee tupelo
OH	Other hardwoods
OK	Oak species
OL	Other lowland species
OO	Osage-orange
OP	Other pines
OS	Other softwoods
OT	Other species
OV	Overcup oak
PA	Pumpkin ash
PB	Paper birch
PC	Pondcypress
PD	Pond pine
PE	Pecan
PH	Pignut hickory
PI	Spruce species
PL	Plums, Cherries
PN	Pin oak
PO	Post oak
PP	Pitch pine
PR	Pin cherry
PS	Common persimmon
PU	Sand pine
PW	Paulownia
PY	Swamp cottonwood
PZ	Ponderosa pine
QA	Quaking aspen
QI	Shingle oak
QN	Bluejack oak
QS	Shumard oak
RA	Redbay
RB	River birch
RC	Eastern redcedar
RD	Redbud
RE	Rock elm
RL	Slippery elm
RM	Red maple
RN	Red pine
RO	Northern red oak
RP	Red pine (plantation)
RS	Red spruce
RY	Red mulberry
SA	Slash pine
SB	Sweet birch/Black birch
SC	Scotch pine
SD	Sourwood
SE	Serviceberry
SG	Sugarberry
SH	Shagbark hickory
SI	Siberian elm
SK	Southern red oak
SL	Shellbark hickory
SM	Sugar maple
SN	Swamp chestnut oak
SO	Scarlet oak
SP	Shortleaf pine
SR	Spruce pine
SS	Sassafras
ST	Striped maple
SU	Sweetgum
SV	Silver maple
SW	Swamp white oak
SY	Sycamore
TA	Tamarack
TL	Tupelo species
TM	Table Mountain pine
TO	Turkey oak
TS	Swamp tupelo
UA	Blue ash
UH	Upland oaks
VP	Virginia pine
WA	White ash
WB	White basswood
WC	Northern white-cedar
WE	Winged elm
WH	Water hickory
WI	Willow species
WK	Water oak
WL	Willow oak
WM	White mulberry
WN	Black walnut
WO	White oak
WP	Eastern white pine
WR	Water birch
WS	White spruce
WT	Water tupelo
YB	Yellow birch
YP	Yellow-poplar
YY	Yellow buckeye

Appendix B: Default Site Index and Base Age Values by Variant

AK — Southeast Alaska, Coastal British Columbia (SEAPROG)

	SS	AF	All others
Base age	50	50	50
Site Index	86	68	80

BM — Blue Mountains

	WP	WL	DF	GF	MH	LP	ES	AF	PP	OT
Base age	50	50	50	50	100	50	100	100	100	50
Site Index	49	45	45	45	21	49	73	70	70	45

CA — Inland California, Southern Cascades (ICASCA)

Region 5
Based on Dunning's site class

Region 6
Based on plant association

CR — Central Rockies (GENGYM)

Southwest Mixed Conifers Model

	AS	All others
Base age	80	100
Site Index	70	70

Southwest Ponderosa Pine Model

	AS	All others
Base age	80	100
Site Index	70	70

Blacks Hills Ponderosa Pine Model

	AS	All others
Base age	80	100
Site Index	57	57

Spruce-Fir Model

	AS	All others
Base age	80	100
Site Index	75	75

Lodgepole Pine Model

	AS	All others
Base age	80	100
Site Index	65	65

CS — Central States (CS TWIGS)

	All species
Base age	50
Site Index	65

EC — Eastside Cascades

	WP	WL	DF	SF	RC	GF	LP	ES	AF	PP	OT
Base age	50	50	50	50	50	100	100	100	100	100	100
Site Index	49	45	45	45	70	45	72	70	70	70	21

EM — Eastern Montana

	All species
Base age	50
Site Index	70

LS — Lake States (LS TWIGS)

	RN	RP	BT	QA	BP	PB	All others
Base age	50	50	50	50	50	50	50
Site Index	58	58	61	61	61	54	60

NC — Northern California (Klamath Mountains)

	OC	SP	DF	WF	MA	IC	BO	TO	RF	PP	OH
Base age	50	50	50	50	50	50	50	50	50	50	50
Site Index	99	99	110	110	63	84	63	63	110	110	63

NE — Northeast (NE TWIGS)

	BF	TA	WS	RS	NS	BS	PI	RN	WP	LP	VP
Base age	50	50	50	50	50	50	50	50	50	50	50
Site Index	52	50	50	50	50	50	50	65	65	65	65

	WC	AW	RC	OC	EH	HM	OP	JP	SP	TM	PP
Base age	50	50	50	50	50	50	50	50	50	50	50
Site Index	42	42	42	42	52	52	65	65	65	65	65

	PD	SC	OS	RM	SM	BM	SV	YB	SB	RB	PB
Base age	50	50	50	50	50	50	50	50	50	50	50
Site Index	65	65	65	56	56	56	56	56	56	56	56

	GB	HI	PH	SL	SH	MH	AB	AS	WA	BA	GA
Base age	50	50	50	50	50	50	50	50	50	50	50
Site Index	56	56	56	56	56	56	56	59	59	59	59

	PA	YP	SU	CT	QA	BP	EC	BT	PY	BC	WO
Base age	50	50	50	50	50	50	50	50	50	50	50
Site Index	59	60	60	60	60	60	60	60	60	60	56

	BR	CK	PO	OK	SO	QI	WK	NP	CO	SW	SN
Base age	50	50	50	50	50	50	50	50	50	50	50
Site Index	56	56	56	56	58	58	58	58	56	56	56

	RO	SK	BO	CB	OH	BU	YY	WR	HB	PS	HY
Base age	50	50	50	50	50	50	50	50	50	50	50
Site Index	58	58	58	58	50	50	50	50	50	50	50

	BN	WN	OO	MG	MV	AP	WT	BG	SD	PW	SY
Base age	50	50	50	50	50	50	50	50	50	50	50
Site Index	50	50	50	50	50	50	50	50	50	50	50

	WL	BK	BL	SS	BW	WB	EL	AE	RL	NC	BE
Base age	50	50	50	50	50	50	50	50	50	50	50
Site Index	50	50	50	50	50	50	50	50	50	42	42

	ST	AI	SE	AH	DW	HT	HH	PL	PR
Base age	50	50	50	50	50	50	50	50	50
Site Index	42	42	42	42	42	42	42	42	42

PN — Pacific Northwest Coast
Based on plant association

SE — Southeast (SE TWIGS)

	All species
Base age	50
Site Index	70

SN — Southern
Based on forest type

SO — South-Central Oregon, Northeast California (SORNEC)

	WP	SP	DF	WF	MH	IC	LP	ES	RF	PP	OT
Base age	50	100	50	50	100	50	50	100	100	100	50
Site Index	99	99	110	110	38	84	90	140	140	140	63

TT — Tetons

	All species
Base age	50
Site Index	50

UT — Utah

	WB	LM	DF	WF	BS	AS	LP	ES	AF	PP	PJ
Base age	50	50	50	50	50	80	50	50	50	50	50
Site Index	28	28	40	40	25	40	30	34	41	34	09

	JU	OA	OT
Base age	50	50	50
Site Index	08	09	28

WC — Westside Cascades
Based on plant association

WS — Westside Sierra Nevada (WESSIN)

	OC	SP	DF	WF	GS	IC	BO	JP	RF	PP	TO
Base age	50	50	50	50	50	50	50	50	50	50	50
Site Index	99	99	110	110	110	84	63	110	110	110	63

Regeneration Establishment Model Keywords

This section provides descriptions of the keywords that are used with the Regeneration Establishment extension to the Forest Vegetation Simulator. With only a few exceptions, the keywords in this section are only recognized by FVS when they are contained in a sequence that begins with the keyword ESTAB and ends with the keyword END. Base model keywords are not recognized when they appear inside this sequence.

The following is a list of all the Regeneration Establishment model keywords. For a full description of the Regeneration Establishment model refer to GTR INT-279, *User's Guide to Version 2 of the Regeneration Establishment Model: Part of the Prognosis Model*.

AUTALLY
BUDWORM
BURNPREP
END
ESTAB
EZCRUISE
HABGROUP
HTADJ
INGROW
MECHPREP
MINPLOTS
NATURAL
NOAUTALY
NOINGROW
NOSPROUT
OUTPUT
PASSALL
PLANT
PLOTINFO
RANNSEED
RESETAGE
SPECMULT
SPROUT
STACKADJ
TALLY
TALLYONE
TALLYTWO
THRSHOLD

AUTALLY

(AUtomatic seedling TALLY)
Regeneration Establishment Extension
Variants: AK, CI, EM, KT, NI
Related keywords: THRESHOLD, NOAUTALY, TALLY, TALLYONE, TALLYTWO

Requests automatic scheduling of regeneration following thinnings in which certain thresholds are exceeded. When 10 to 30 percent of the trees per acre or total cubic foot volume is removed, a single regeneration tally is scheduled. When more than 30 percent of the trees per acre or total cubic foot volume is removed, a tally sequence is scheduled. These percentages can be modified using the THRESHOLD keyword.

No fields are associated with this keyword.

Note: This keyword is only used in FVS variants that have the capability for automatic prediction of natural regeneration (AK, CI, EM, KT, and NI).

Caution: The base model keyword NOAUTOES invokes the NOAUTALY, NOINGROW and NOSPROUT keywords.

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 8

BUDWORM

(spruce BUDWORM)
Regeneration Establishment Extension
Variants: All

Specifies defoliation histories for western spruce budworm and the effects of budworm defoliation on regeneration success.

field 1: Year or cycle that defoliation began. A 0 (zero) or blank results in an error message.

field 2: Last year of defoliation. A 0 (zero) or blank is replaced with the value in field 1 resulting in one year of defoliation.

Note: Up to 20 BUDWORM keyword records can be present in a projection.

Note: If budworm effects are represented by the Budworm Model then this keyword is not necessary.

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 11

BURNPREP

(BURNing site PREParation)
Regeneration Establishment Extension
Variants: ALL
Related keywords: MECHPREP

Specifies the percentage of regeneration plots receiving site preparation by burning. When site preparation treatments have not been specified or assigned with BURNPREP or MECHPREP keywords, default equations are invoked. These equations predict the proportion of the stand receiving each of the three treatments (burning, mechanical scarification, and no disturbance) based on site characteristics such as slope, aspect, habitat type, residual basal area, elevation, and topographic position.

field 1: Year or cycle of site preparation. *Default = 0 (all cycles)*

field 2: Percentage of plots to be treated. *Range: 0-100, Default = 0*

Note: The sum of mechanical and burn treatments must be less than, or equal to, 100 percent. If the sum is less than 100 percent, the difference is the percentage of undisturbed plots.

Note: Site preparations can be assigned to individual plots if desired. See PLOTINFO keyword.

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 11

END

(END of regeneration sequence)
Regeneration Establishment Extension
Variants: ALL
Related keywords: ESTAB

Signifies the end of the Regeneration Establishment sequence of keywords that was begun with the ESTAB keyword. Essentially, the END keyword returns control of the simulation to the base FVS system after the Regeneration Establishment extension has been called.

No fields are associated with this keyword.

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 12

ESTAB

(ESTABlishment model)
Regeneration Establishment Extension
Variants: All
Related keywords: END

Signifies the beginning of keywords for the Regeneration Establishment extension. The ESTAB keyword sequence must be terminated with an END keyword. All keywords between ESTAB and END are considered Establishment extension keywords.

field 1: Year or cycle of disturbance or beginning of regeneration. The seedling tally sequence will begin in this year. *Default = 0 (all cycles)*

Caution: Some care is necessary when entering a disturbance date to insure that the regeneration establishment model is called at the correct time. Pay close attention to cycle boundaries when entering disturbance date.

Caution: If the ESTAB keyword is embedded in an event monitor sequence, year of disturbance (field 1) is interpreted as years from the time the condition is true until establishment, or in other words, a lag time. (e.g. a 5 in field 1 means wait 5 years after condition is true to establish the stand.)

Note: The Regeneration Establishment extension keyword sequence must begin with an ESTAB keyword and end with an END keyword; all keywords contained within this sequence are considered Regeneration Establishment keywords.

References: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 11
GTR INT-133, User's Guide to the Stand Prognosis Model, p. 86

EZCRUISE (Easy CRUISE)

Regeneration Establishment Extension
Variants: All

Requests prediction of the small tree component at the time of the inventory. This keyword is used if the stand inventory did not include regeneration less than 3 inches dbh.

No fields are associated with this keyword.

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 12

HABGROUP (HABitat type GROUP)

Regeneration Establishment Extension
Variants: All

Requests that an optional output table that shows habitat types within the habitat type groups shown in the regeneration summary output table be written to the standard FVS output file.

No fields are associated with this keyword.

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 12

HTADJ (regeneration HeighT ADJustment)

Regeneration Establishment Extension
Variants: All

Specifies a species-specific initial height adjustment for newly established trees before the tree records are passed to the base FVS model.

field 1: Year or cycle the adjustment is to be applied. Once in effect it remains in effect until replaced by a subsequent multiplier. *Default = 1*

field 2: Species code for trees to be adjusted. *Default = All*

field 3: Height in feet to be added to the seedling height assigned by the Regeneration Establishment extension. A negative value results in a reduction in height. *Default = 0*

Note: The HTADJ keyword should not be confused with the FVS base model keyword REGHMULT, which is a multiplier.

Note: The value entered in field 3 can be positive or negative, but resulting heights will not be shorter than a preset minimum (usually 0.5 or 1.0 feet), nor taller than the height of a tree 3 inches dbh.

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 13

INGROW

(INGROWth)
Regeneration Establishment Extension
Variants: AK, CI, EM, KT, NI
Related keywords: NOINGROW

Requests addition of new trees in the absence of disturbance in recent cycles. Ingrowth will occur every 20 years after the completion of a regeneration period if there are no regeneration activities scheduled for the next cycle. Tree records that are created for ingrowth tallies can include trees up to 20 years old, so an assortment of tree sizes is added to the simulation.

No fields are associated with this keyword.

Note: This keyword is only used in FVS variants that have the capability for automatic prediction of natural regeneration (AK, CI, EM, KT, and NI).

Caution: The base model keyword NOAUTOES invokes the NOAUTALY, NOINGROW and NOSPROUT keywords.

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 8

MECHPREP

(MECHanical site PREParation)
Regeneration Establishment Extension
Variants: All
Related keywords: BURNPREP

Specifies the percentage of regeneration plots receiving site preparation by mechanical means. When site preparation treatments have not been specified or assigned with MECHPREP or BURNPREP keywords, default equations are invoked. These equations predict the proportion of the stand receiving each of the three treatments (burning, mechanical scarification, and no disturbance) based on site characteristics such as slope, aspect, habitat type, residual basal area, elevation, and topographic position.

field 1: Year or cycle of site preparation. *Default = 0 (all cycles)*

field 2: Percentage of plots to be treated. *Range: 0-100, Default = 0*

Note: The sum of mechanical and burn treatments must be less than, or equal to, 100 percent. If the sum is less than 100 percent, the difference is the percentage of undisturbed plots.

Note: Site preparations can be assigned to individual plots if desired. See PLOTINFO keyword.

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 11

MINPLOTS

(MINimum number of PLOTS)
Regeneration Establishment Extension
Variants: All

Specifies the minimum number of plots to process. The regeneration model produces plot-to-plot variation in the number of trees per plot, species composition, and initial tree heights. Stand statistics are averages of plot predictions, so a large number of plots reduces the random variation for the stand. Plots are repeatedly doubled until the user-specified minimum number is reached.

field 1: Minimum number of plots to process. *Minimum = 20, Default = 50*

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 13

NATURAL

(NATURAL regeneration)
Regeneration Establishment Extension
Variants: All
Related keywords: PLANT

Specifies natural regeneration that will be added to the stand.

field 1: Year or cycle of regeneration. An entry is required, and must be equal to, or greater than, the disturbance date specified on the ESTAB keyword.

field 2: Species code for trees to be naturally regenerated. *Entry required*

field 3: Number of trees per acre of the species designated in field 2 to be regenerated. *Default = 0*

field 4: Percent survival expected for this species at the end of the current cycle. *Range: 0-100, Default = 100*

field 5: Average seedling age in years for the year specified in field 1. *Default = 2*

field 6: Average seedling height in feet five years from the time of seedling appearance or at the end of the cycle, whichever is earlier.

field 7: Shade code. *Default = 0*

0	Seedlings occur uniformly on plots throughout the stand.
1	Seedlings occur more frequently on plots with more overstory basal area.
2	Seedlings occur more frequently on plots with less overstory basal area.

Note: A separate NATURAL keyword is necessary for each species.

Note: Use of this keyword sets STOCKADJ to 0.0 and activates the NOINGROW and NOAUTALY keywords.

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 11

NOAUTALY

(NO AUTomatic seedling TALLY)
Regeneration Establishment Extension
Variants: AK, CI, EM, KT, NI
Related keywords: AUTALLY, NOINGROW, NOSPROUT

Suppresses the automatic scheduling of regeneration following thinnings (see AUTALLY).

No fields are associated with this keyword.

Note: This keyword is only used in FVS variants that have the capability for automatic prediction of natural regeneration (AK, CI, EM, KT, and NI).

Note: The base model keyword NOAUTOES invokes the NOAUTALY, NOINGROW and NOSPROUT keywords.

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 13

NOINGROW (NO automatic INGROWth)
Regeneration Establishment Extension
Variants: AK, CI, EM, KT, NI
Related keywords: INGROW, NOAUTALY, NOSPROUT

Suppresses the automatic scheduling of ingrowth (see INGROW).

No fields are associated with this keyword.

Note: This keyword is only used in FVS variants that have the capability for automatic prediction of natural regeneration (AK, CI, EM, KT, and NI).

Note: The base model keyword NOAUTOES invokes the NOAUTALY, NOINGROW and NOSPROUT keywords.

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 13

NOSPROUT (NO stump or root SPROUTing)
Regeneration Establishment Extension
Variants: All
Related keywords: SPROUT, NOINGROW, NOAUTALY

Suppresses the automatic scheduling of root and stump sprouting following thinning (see SPROUT).

No fields are associated with this keyword.

Note: The base model keyword NOAUTOES invokes the NOAUTALY, NOINGROW and NOSPROUT keywords.

OUTPUT (OUTPUT tables)
Regeneration Establishment Extension
Variants: All

Specifies printing of regeneration summary tables.

field 1: Summary table output flag. *Default = 1*

0	Suppress all output (tree records still passed to FVS model)
1	Print standard regeneration summary table
2	Print calculations as they occur (i.e. debug printout)
3	Print standard summary tables plus plot summary table

field 2: File reference number for output. If this field is left blank output will be written to the FVS output file. If the value is any number other than 16 or blank, then an associated output file needs to be opened with OPEN keyword. *Default = 16*

Caution: The debug option produces a great deal of output that is not useful to most users.

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 12

PASSALL

(PASS ALL seedling records)
Regeneration Establishment Extension
Variants: All

Requests the transfer of "all" predicted seedlings from the Regeneration Establishment model to the FVS tree list during the tally. "All" seedlings include "desirable", "acceptable", and "excess" seedlings.

No fields are associated with this keyword.

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 4

PLANT

(PLANT seedlings)
Regeneration Establishment Extension
Variants: All
Related keywords: NATURAL

Specifies planting of seedlings that will be added to the stand.

field 1: Year or cycle of regeneration. An entry is required, and must be equal to, or greater than, the disturbance date specified on the ESTAB keyword.

field 2: Species code for trees to be naturally regenerated. *Entry required*

field 3: Number of trees per acre of the species designated in field 2 to be planted. *Default = 0*

field 4: Percent survival expected for this species at the end of the current cycle. *Range: 0-100, Default = 100*

field 5: Average seedling age in years for the year specified in field 1. *Default = 2*

field 6: Average seedling height in feet five years from the time of planting or at the end of the cycle, whichever is earlier.

field 7: Shade code. *Default = 0*

- 0 Seedlings occur uniformly on plots throughout the stand.
- 1 Seedlings occur more frequently on plots with more overstory basal area.
- 2 Seedlings occur more frequently on plots with less overstory basal area.

Note: A separate PLANT keyword is necessary for each species.

Note: Planted trees are in addition to natural regeneration and do compete with naturals in the best tree selection process.

Note: The STOCKADJ keyword can be used in conjunction with planting to suppress natural regeneration so that only planted trees are passed to the FVS model.

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 11

PLOTINFO (PLOT INFOrmation)

Regeneration Establishment Extension
Variants: All
Related keywords: NATURAL

Specifies plot specific values for slope, aspect, habitat type, topographic position, and site preparation. This keyword is used when plot information is not contained on the tree data records. A separate record is required for each plot (either as a supplemental record or as a record in the file designated in field 1 and opened with an OPEN keyword).

field 1: File reference number for input. If this field is left blank supplemental data records are assumed to follow immediately after the PLOTINFO keyword in the keyword file.

Supplemental record format:

Columns 1-10: Plot identification number coded the same as in the FVS model. A record with a negative number in these columns must be present to signify the end of PLOTINFO supplemental data records.

Column 11: Slope percent code.

Column 12: Aspect code.

Column 13-15: Numeric habitat type code.

Column 16: Topographic position code.

Column 17: Site preparation code.

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model, p.24,33

RANNSEED (RANdom Number SEED)

Regeneration Establishment Extension
Variants: All

Reseeds the pseudorandom number generators used in the Regeneration Establishment model. If a 0 (zero) is used as the replacement value for the seed, the model will run stochastically (i.e. results will vary for multiple runs of the same simulation file). With any non-zero seed value the model will run deterministically (i.e. the results will be the same for multiple runs of the same simulation file).

field 1: Replacement value for the pseudorandom number seed (should be an odd integer). *Default = 55329*

Note: The FVS base model and the Regeneration Establishment extension use separate pseudorandom number generators. Each one can be reseeded independently. Using a

RANNSEED keyword inside an ESTAB-END sequence affects the Regeneration Establishment extension.

References: GTR INT-133, User's Guide to the Stand Prognosis Model, p. 94
GTR INT-208, Supplement to the User's Guide..., p. 14
GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 32

Refer to GTR INT-394, Implications of Random Variation in the Stand Prognosis Model, for a discussion of the stochastic nature of the model.

RESETAGE

(RESET stand AGE)
Regeneration Establishment Extension
Variants: All

Sets the stand age to zero to make FVS model output correspond to the actual age of the stand. Age is strictly for reporting purposes and has no effect on growth or survival prediction. Its only effect is on the calculation of mean annual increment. This keyword is useful when average stand age has changed due to thinnings and plantings.

field 1: Year or cycle that stand age is to be changed (usually the year of disturbance).

field 2: New stand age. *Default = 0*

Note: This is also a base model keyword. Both have exactly the same effect.

SPECMULT

(SPECies occurrence MULTiplier)
Regeneration Establishment Extension
Variants: AK, CI, EM, KT, NI

Specifies a species-specific multiplier that increases or decreases the probability of a species' occurrence in natural regeneration. The multiplier does not set the probability of a species' occurrence; it is multiplied by the default probability to increase or decrease the probability of occurrence. Thus, a multiplier of 1.0 has no effect on the default probability for that species.

field 1: Year or cycle the multiplier takes effect. *Default = 1*

field 2: Species code to which the multiplier will be applied. *Entry required*

field 3: Multiplier value. *Range: 0.0-1.0, Default = 1.0*

Note: A separate SPECMULT keyword record is needed for each species to be modified.

Note: This keyword is only used in FVS variants that have the capability for automatic prediction of natural regeneration (AK, CI, EM, KT, and NI).

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 13

SPROUT

(stump or root SPROUTing)
Regeneration Establishment Extension
Variants: All
Related keywords: NOSPROUT, INGROW, AUTALY

Requests the automatic scheduling of root and stump sprouting following thinning. Only those species that are prone to stump or root sprouting will have this type of regeneration scheduled. This keyword has no effect on species that do not sprout.

No fields are associated with this keyword.

Caution: The base model keyword NOAUTOES invokes the NOAUTALY, NOINGROW and NOSPROUT keywords.

STOCKADJ

(STOCKing ADJustment)
Regeneration Establishment Extension
Variants: AK, CI, EM, KT, NI

Adjusts the probability of natural regeneration stocking upward or downward. The probability of stocking will be multiplied by the value entered in field 2, but the product will be bounded within the interval [0,1]. The multiplier is calculated by dividing the desired probability of stocking by the predicted probability of stocking. As an example, suppose the regeneration model predicts the probability of stocking 10 years after a harvest is 0.40 and it is desired to raise this figure to 0.50 in a subsequent run. The value to enter in field 2 is 1.25 (0.50/0.40 = 1.25). In other words, the desired probability is 1.25 times the predicted probability.

field 1: Year or cycle the multiplier takes effect. *Default = 1*

field 2: Multiplier for the probability of stocking. *Default = 1.0 (CI default = 0.0)*

Note: If field 2 is blank or 0 (zero) natural regeneration is cancelled so that only planted trees regenerate. This is useful in simulating growth of plantations or to input a list of trees on a habitat type that the Regeneration Establishment extension is not presently calibrated for.

Note: This keyword is only used in FVS variants that have the capability for automatic prediction of natural regeneration (AK, CI, EM, KT, and NI).

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 15

TALLY

(seedling TALLY)
Regeneration Establishment Extension
Variants: All
Related keywords: TALLYONE, TALLYTWO, AUTALY

Schedules a tally sequence for prediction of regeneration, and optionally supplies a disturbance year. Regeneration is reported in a summary called a tally. At each tally, new regeneration is added to the FVS Model tree list and a regeneration summary output table is printed. A tally will be predicted for every cycle boundary for 20 years following the beginning of the sequence. For example, if cycle lengths were 5 years, four tallies would result.

field 1: Year or cycle the tally sequence is to begin. *Entry required*

field 2: Optional field to supply the year of disturbance. This value takes precedence over the value in field 1 of the ESTAB keyword record. If blank, the year of disturbance is determined from field 1 of the ESTAB keyword record.

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p. 13

TALLYONE

(seedling TALLY ONE)
Regeneration Establishment Extension
Variants: All
Related keywords: TALLYTWO, TALLY, AUTALY

Specifies the year in which the first regeneration tally is to occur, and optionally supplies a disturbance year. Regeneration is predicted at the end of the cycle, so the specified tally year should be one year prior to the end of the cycle. For example, if, in a simulation using 5-year cycles, a regeneration harvest is scheduled for 2010 and the first tally is desired 10 years later, the tally year specified in the TALLYONE keyword should be 2019 (one year prior to the 2020 cycle boundary). The TALLYONE keyword takes precedence over the tally sequence scheduled by the ESTAB keyword or the TALLY keyword.

field 1: Year the first regeneration tally is to be reported. *Entry required*

field 2: Optional field to supply the year of disturbance. This value takes precedence over the value in field 1 of the ESTAB keyword record. If blank, the year of disturbance is determined from field 1 of the ESTAB keyword record.

Note: At the first regeneration tally (TALLYONE), both planted trees and natural regeneration are passed to the FVS model.

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p.7,12

TALLYTWO

(seedling TALLY TWO)
Regeneration Establishment Extension
Variants: All
Related keywords: TALLYONE, TALLY, AUTALY

Specifies the year in which the second regeneration tally is to occur, and optionally supplies a disturbance year (see TALLYONE). If a TALLYTWO is scheduled without a TALLYONE being scheduled, the TALLYTWO is changed to a TALLYONE. Regeneration is predicted at the end of the cycle, so the specified tally year should be one year prior to the end of the cycle. The TALLYTWO keyword takes precedence over the tally sequence scheduled by the ESTAB keyword or the TALLY keyword.

field 1: Year the second regeneration tally is to be reported. *Entry required*

field 2: Optional field to supply the year of disturbance. This value takes precedence over the value in field 1 of the ESTAB keyword record. If blank, the year of disturbance is determined from field 1 of the ESTAB keyword record.

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p.7,12

THRSHOLD (automatic regeneration THReSHOLDs)
Regeneration Establishment Extension
Variants: All
Related keywords: AUTALY

Changes the threshold values that schedule automatic regeneration tallies following thinnings. Values refer to the percentage of either trees per acre or total cubic foot volume removed in the thinnings. A single regeneration tally is scheduled if the percentage removed falls between the lower and upper percentages specified on this keyword. An entire tally sequence is scheduled if the percentage removed is greater than the upper percentage specified on this keyword. If this keyword is not used the lower percentage is 10 and the upper percentage is 30.

field 1: Lower removal percentage. *Range: 2.5-95.0, Default = 10*

field 2: Upper removal percentage. *Range: 5.0-97.5, Default = 30*

Note: The value in field 1 must be lower than the value in field 2.

Reference: GTR INT-279, User's Guide to the Regeneration Establishment Model..., p.8,13